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Research Paper

Epidemiological Profile of Crimean-Congo Hemorrhagic Fever in Thi-Qar Province, Iraq: A Three-Year Retrospective Analysis

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ABSTRACT

Background: Crimean-Congo hemorrhagic fever (CCHF) is a severe disease. It is most commonly spread by the bite of an infected tick of the Hyalomma genus, or by direct contact with blood and bodily fluids of an infected person or other animals. The current study aimed to determine the prevalence of hemorrhagic fever cases during 3 years in Thi-Qar province and also study demographic factors.

Methods: Data were collected from the records of the Statistics Unit at the Public Health Laboratory. The epidemiological data were collected from the beginning of December 2023 to the end of March 2024.

Results: A total of 319 cases were recorded, including 184 (57.7%) males and 135 (42.3%) females. The number of people who recovered was 256 (80.3%), whereas the number of deceased cases recorded was 63 (19.7%). The highest rate of infection appeared in the age group of 20–39 years (41.4%), and the lowest proportion (11.0%) was in the ≥60 years age group. According to occupation, housewives had the highest proportion (37.9%). Total annual infections were recorded at 4.7%, 50.8%, and 44.5%, respectively.

Conclusion: The study highlighted the epidemiological features. The results indicate patterns in the distribution of cases across demographic and geographic variables. We conclude from the current study that occupational and home exposure, especially among housewives, are among the most common cases of hemorrhagic fever.

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Introduction

Viral hemorrhagic fevers (VHFs) are a group of illnesses caused by four families of viruses, namely - Arenaviridae, Bunyaviridae, Filoviridae and Flaviviridae [1]. This is a profile of enveloped viruses; some of the viruses cause mild illness, while others are life-threatening and thus the degree of clinical illness considerably varies [2]. The first documented case of CCHF in Iraq occurred in 1979. Iraqi health authorities issue several hundred cases of CCHF every year, but the growing disease burden set off alarm bells in early 2022. It gets even worse in Iraq where they farm actually cattle. Most of the people who infected were shepherds or butchers or had contact with them. The infection is accompanied by fever, headache, muscle pain and bleeding [6]. CCHF is an acute tick-borne zoonotic disease caused by the Crimean-Congo virus (CCHFV), a member of the genus Nairovirus in Family Nairoviridae [7]. Typically, the typical cases begin with headache, fever, malaise and gastrointestinal symptoms/bleeding following by shock and multi-organ system failure (severe form), although 60–80% of infections are asymptomatic [8]. Indeed, CCHF has the widest geographical spread, being limited to the distribution of vector hard ticks (mainly Hyalomma marginatum) in Africa, Asia and Europe [9]. Turkey and Iran, neighbouring northern and eastern sites of Iraq, reported as endemic areas to CCHF [10], also both reported incident outbreaks and an increasing number of cases registered, respectively [11]. Human infection with CCHF in Iraq was first reported in 1979, and outbreaks of disease have occurred sporadically since then, with intervals of no recorded cases. While there were 0 cases in 2008, 2014, 2016 and 2017 (the first reported case was in September at that point), the most cases on record in one year is ten — seen only in 2020. This has been due to a major increase in case numbers reported during the last 2 years, with 19 laboratory-confirmed cases in Iraq in 2021 and relative high number of laboratory-confirmed cases from this year till now (June), with reporting of 108 cases by the Ministry of Health/ Iraq [12]. Due to the spread of haemorrhagic fever in Thi-Qar province, which has lost control over it, and also annual infection rates fluctuate. Therefore, the study aimed to determine the prevalence of hemorrhagic fever cases in Thi-Qar province for 3 years. In addition, to study the demographic factors' effect on the infection.

Materials and Methods

Data collection

This study is a retrospective descriptive-analytical study conducted to assess the prevalence of hemorrhagic fever in Thi-Qar province. This research was conducted in the Public Health Laboratory, after obtaining approval to conduct the research from the Nasiriyah Technical Institute, then sending it to the Research and Development Department in the Thi-Qar Health Office. Data were collected from the records of the Statistics Unit at the Public Health Department in Thi-Qar province. The data collection period extended from the beginning of December 2023 to the end of March 2024.

Statistical analysis

The number and percentages of different variables were presented using study parameters. The data were analyzed with SPSS Version 22. Chi-square test is used to analyze the variables to determine whether there exist an association exists between those variables or not. The significance level was set at $P \leq 0.05$.

Results

As a result of the importance of the matter, the present study aimed to describe the sociodemographic, epidemiological, and clinical characteristics of hemorrhagic fever cases in a sample of 319 patients. In terms of age distribution, the highest proportion of cases was observed in the 20–39 years age group (41.4%), followed by individuals aged 40–59 years (31.7%). This is consistent with previous studies that highlight young and middle-aged adults as more susceptible, possibly due to greater occupational exposure or increased involvement in livestock handling and meat processing. The relatively lower proportions among those under 20 (16.0%) and over 60 (11.0%) may reflect reduced exposure or protective factors such as less outdoor activity or better awareness among older populations. The sex distribution revealed that males (57.7%) were more frequently affected than females (42.3%) and showed that (53.3%, 42.6%, 40.8%) of cases in 2021, 2022 and 2023 were female respectively while (46.7%, 57.4%, 59.2%) were male this deference was not

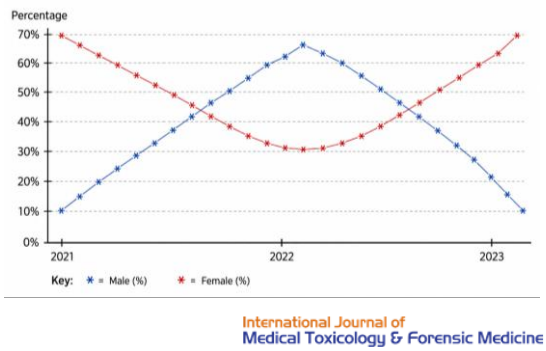

Figure 1. Gender distribution of CCHF cases by Year (2021- early 2024).

Table 1. Distribution of the study sample by socio-demographic for patients.

Var.	Groups	Freq.	%
Age Groups	<20 years	51	16.0
	20-39 years	132	41.4
	40-59 years	101	31.7
	≥60 years	35	11.0
	Total	319	100.0
Sex	Female	135	42.3
	Male	184	57.7
	Total	319	100.0
Patients' occupation	Butcher	39	12.2
	Child	3	0.9
	Cleaner work	1	0.3
	Cooker	2	0.6
	Earner	52	16.3
	Employee	22	6.9
	house wife	121	37.9
	Livestock breeders	44	13.8
	Military	5	1.6
	Student	30	9.4
	Total	319	100.0

statistically significant with chi sq. value (0.887) and p value (0.645). Regarding occupational distribution, housewives constituted the largest group (37.9%) among the infected cases (Figure 1). This is an important finding, potentially linked to household slaughtering practices, which was also supported by the high percentage (57.1%) of cases reporting slaughtering animals inside their homes. Other prominent occupational groups included earners, livestock breeders, and butchers, all of which involve close interaction with animals or animal products Table 1.

Epidemiologically, the highest infection was reported in 2022 (50.8%), with a slight decrease in 2023 (44.5%) and a low incidence in 2021 (4.7%) (Table 2). Notably, the highest number of cases occurred during summer months, which supports the seasonal nature of tick activity and increased human-animal interaction during that time (Fig. 2).

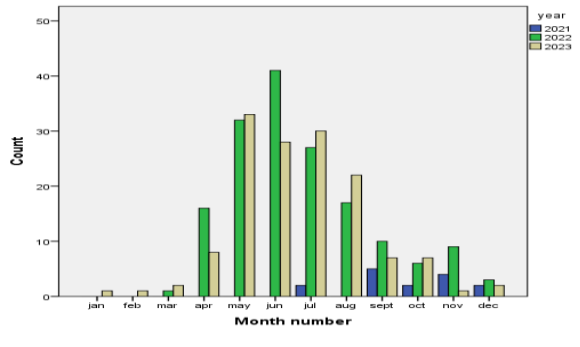

Figure 2. Distribution of recorded cases according to the month of recording.

Modes of transmission were primarily contact with animals (58.6%) and raw meat (40.8%). Contact with positive human cases was minimal (0.6%), reinforcing the zoonotic nature of the disease. These findings align with the literature emphasizing the importance of animal reservoirs and poor meat-handling practices in hemorrhagic fever outbreaks. The geographic analysis showed that rural residents constituted 46.1% of the sample, and the statistical test indicated a significant association between the type of area and year of infection ($p = 0.015$). This finding highlights how environmental and occupational exposures differ between urban, suburban, and rural settings, with rural areas likely facing higher vector exposure due to proximity to livestock and an open environment Table 2.

The presence of animals near homes (64.9%) and ticks in barns (64.3%) were major risk factors identified, further supporting the hypothesis that environmental and vector-borne exposures play a key role in disease transmission. The percentage low for cases reporting prior infections in the area (12.5%) and direct contact with other infected persons (3.8%) further confirms the limited role of human-to-human transmission in this context Table 3.

Interestingly, the analysis did not reveal statistically significant differences in infection rates by sex ($p = 0.645$) or age group ($p = 0.46$) across the years. However, the significant variation in infection rates by type of area ($p= 0.015$) suggests that geographic and environmental factors may influence exposure risk more strongly than demographic characteristics alone. The analysis showed a relationship between age group and years, with no statistically significant relationship

Table 2. Distributions Epidemiological of hemorrhagic fever cases.

Var.	Groups	Freq.	%
Year	2021	15	4.7
	2022	162	50.8
	2023	142	44.5
	Total	319	100.
Mode of Transmission	Animal	187	58.6
	Positive case	2	0.6
	Raw meat	130	40.8
	Total	319	100
Types of area	Rural	147	46.1
	suburban	66	20.7
	Urban	106	33.2
	Total	319	100

Table 3. Risk factors of infection with hemorrhagic fever.

Var.	Symptoms	Yes	%	No	%
Clinical Risk Factors	Are there animals near the residence?	207	64.9	112	35.1
	Are there ticks on animals or in barns?	205	64.3	114	35.7
	Was an animal slaughtered during the current month inside the house?	182	57.1	137	42.9
	Is there any contact with a similar case?	12	3.8	307	96.2
	Are there any confirmed previous infections in the same residential area?	40	12.5	279	87.5

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(chi-sq. value =5,65 and p value =0,46 Table 4.

Discussion

According to this study, the number of infections and death cases stands at 63, while the number of recoveries reached 265 cases. The age distribution observed shows a high rate of infection in the age group (20–39) years, followed by the (40–59) years, suggesting that working-age adults are disproportionately affected. This may be attributed to their increased exposure through occupational activities, which are usually young people, such as farming, animal handling, or household responsibilities involving raw meat processing. The most productive segment of society is the most vulnerable to infection; this result agrees with Kodama et al [16], while our study disagrees with Ding et al [17]. Sex -based differences showed a higher frequency of cases among males compared to females, which, although not statistically significant, corresponds with the tendency of males to be employed in outdoor or high-risk occupations such as Livestock breeders or butchers are more susceptible to infection, this is similar studies with Al-Khafaji et al [18] in Thi-Qar, while our study disagrees with Qian et al [19] in China. Nonetheless, the significant proportion of female cases—especially among housewives underscores the relevance of domestic exposure, particularly due to home-based animal slaughtering practices, This results agrees with other studies to Hazim et al [20] that males are more affected than females and the workforce in Iraq's animal sector majority of males, and the professions most at risk are farmers and housewives, Study conducted from 1995 to 2015 reported by Sharifi Fard et al, in Khuzestan that high occupational groups at risk, were housewives and farmers [21]. Seasonal trends were apparent, with increased incidence during summer months, consistent with heightened vector activity (e.g., ticks) and increased animal-human interactions in warmer seasons, our study agrees with other research studies that summer has the highest incidence of infections and tick activity with rising temperature [27] The result showed the relationship between the region and infections, high number of infections in rural areas, The reason for this is a lack of health awareness in rural areas, increased contact with livestock and animals, and a lack of health supervision, unlike in urban areas, this study agrees with several studies that rural areas are more susceptible to infection [22]. This pattern is observed in most viral and parasitic infections; it is more prevalent in rural areas due to a lack of health and monitoring services, a finding corroborated by a recent study, Flaih, M. H, et al [28]. In table 3 showed the risk factors were through direct contact with animals or proximity to the place of residence, as well as slaughtering some livestock inside homes, in addition to the presence of previous cases and contact with them, and these are certain reasons for the occurrence of infections, and this study agrees with the opinion of a study in Turkestan region [29], There may be fluctuations in the ratios between males and females

Table 4. Relationship between the age group and those infected with hemorrhagic fever.

Var.	2021		2022		2023	
	Freq.	%	Freq.	%	Freq.	%
<20 years	4	26.7	24	14.8	23	16.2
20-39 years	8	53.3	62	38.3	62	43.6
40-59 years	3	20	57	35.2	41	28.9
≥60 years	0	0	19	11.7	16	11.3
Total	15	100	162	100	142	100

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Chi sq.= 5.65 P value = 0.46

from one year to another, as the proportion of females was higher in 2021, while males were higher in 2022 and 2023, which means that there are no significant differences between the sexes, and the reasons for the differences are due to reasons we mentioned previously, such as occupational exposure and environmental conditions, and Not because of sex itself, studies have agree with Hazim et al [20]. We notice significant differences, which confirms that the type of region is an influential factor in the spread of hemorrhagic fever. The increase that occurred in 2023 may be in the urban area, which indicates the possibility of the disease being transmitted from rural to urban regions. The reason for the increase in some cases in urban areas may be due to the migration of livestock breeders from rural to urban areas for the purpose of selling animals, especially during Eid al-Adha and some religious occasions. Our study agrees with Abdulrahman et al in Iraq [30].

Conclusion

This study identified key risk groups and transmission pathways associated with hemorrhagic fever in the study area. We conclude from the current study that occupational and home exposure, especially among housewives, is the most common cause of hemorrhagic fever. Therefore, practices related to the occupational pattern play a crucial role in the transmission of infection. These results necessitate strengthening public health interventions through health education and awareness about disease transmission, improving control measures and monitoring systems, especially in rural areas and promoting safe animal handling practices. Future studies should focus on vector ecology, community awareness, and the effectiveness of local surveillance systems to mitigate disease outbreaks.

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Conflicts of Interest

The authors report there are no competing interests to declare.

References

[1] Rempe RG, Hartz AMS, Bauer B. Matrix metalloproteinases in the brain and blood–brain barrier: versatile breakers and makers. J Cereb Blood Flow Metab 2016;36:1481–507. [DOI: 10.1177/0271678X16655551]

[2] Lama A, Pirozzi C, Avagliano C, Annunziata C, Mollica MP, Calignano A, et al. Nutraceuticals: An integrative approach to starve Parkinson's disease. Brain, Behav Immunity-Health 2020;2:100037. [DOI: 10.1016/j.bbih.2020.100037]

[3] Awad K, Abushouk AI, AbdelKarim AH, Mohammed M, Negida A, Shalash AS. Bee venom for the treatment of Parkinson's disease: How far is it possible? Biomed Pharmacother 2017;91:295–302. [DOI: 10.1016/j.biopha.2017.04.065]

[4] Werner MH, Olanow CW. Parkinson's disease modification through Abl kinase inhibition: an opportunity. Mov Disord 2022;37:6–15. [DOI: 10.1002/mds.28858]

[5] Thomas B, Beal MF. Parkinson's disease. Hum Mol Genet 2007;16:R183–94. [DOI: 10.1093/hmg/ddm159]

[6] Titova N, Qamar MA, Chaudhuri KR. The nonmotor features of Parkinson's disease. Int Rev Neurobiol 2017;132:33–54. [DOI: 10.1016/bs.irn.2017.02.016]

[7] Cetin S, Knez D, Gobec S, Kos J, Pišlar A. Cell models for Alzheimer's and Parkinson's disease: At the interface of biology and drug discovery. Biomed Pharmacother 2022;149:112924. [DOI: 10.1016/j.biopha.2022.112924]

[8] Presgraves SP, Ahmed T, Borwege S, Joyce JN. Terminally differentiated SH-SY5Y cells provide a model system for studying neuroprotective effects of dopamine agonists. Neurotox Res 2003;5:579–98. [DOI: 10.1007/BF03033178]

[9] Hong N. Photobiomodulation as a treatment for neurodegenerative disorders: current and future trends. Biomed Eng Lett 2019;9:359–66. [DOI: 10.1007/s13534-019-00115-x]

[10] Karu TI. Multiple roles of cytochrome c oxidase in mammalian cells under action of red and IR-A radiation. IUBMB Life 2010;62:607–10. [DOI: 10.1002/iub.359]

[11] Hamblin MR. Photobiomodulation or low-level laser therapy. J Biophotonics 2016;9:1122. [DOI: 10.1002/jbio.201670113]

[12] Han X, Han B, Zhao Y, Li G, Wang T, He J, et al. Rosmarinic acid attenuates rotenone-induced neurotoxicity in SH-SY5Y Parkinson's disease

cell model through Abl inhibition. Nutrients 2022;14:3508. [DOI: 10.3390/nu14173508]

[13] Liu Q, Wu H, Zhang H, Pan Y, Du S, Song W, et al. Heat shock protein is associated with inhibition of inflammatory cytokine production by 630 nm light-emitting diode irradiation in fibroblast-like synoviocytes based on RNA sequencing analysis. Photobiomodulation, Photomedicine, Laser Surg 2022;40:751–62. [DOI: 10.1089/photob.2022.0041]

[14] Chung H, Dai T, Sharma SK, Huang Y-Y, Carroll JD, Hamblin MR. The nuts and bolts of low-level laser (light) therapy. Ann Biomed Eng 2012;40:516–33. [DOI: 10.1007/s10439-011-0454-7]

[15] Li P, Lv H, Zhang B, Duan R, Zhang X, Lin P, et al. Growth differentiation factor 15 protects SH-SY5Y cells from rotenone-induced toxicity by suppressing mitochondrial apoptosis. Front Aging Neurosci 2022;14:869558. [DOI: 10.3389/fnagi.2022.869558]

[16] Pirunkaset E, Boonyarat C, Maneenet J, Khamphukdee C, Daodee S, Monthakantirat O, et al. Effect of diacetylcurcumin manganese complex on rotenone-induced oxidative stress, mitochondria dysfunction, and inflammation in the SH-SY5Y Parkinson's Disease cell model. Molecules 2024;29:957. [DOI: 10.3390/molecules29050957]

[17] Ibarra-Gutiérrez MT, Serrano-García N, Orozco-Ibarra M. Rotenone-induced model of Parkinson's disease: beyond mitochondrial complex I inhibition. Mol Neurobiol 2023;60:1929–48. [DOI: 10.1007/s12035-022-03193-8]

[18] Hörmann P, Delcambre S, Hanke J, Geffers R, Leist M, Hiller K. Impairment of neuronal mitochondrial function by L-DOPA in the absence of oxygen-dependent auto-oxidation and oxidative cell damage. Cell Death Discov 2021;7:151. [DOI: 10.1038/s41420-021-00547-4]

[19] Asanuma M, Miyazaki I, Ogawa N. Dopamine-or L-DOPA-induced neurotoxicity: the role of dopamine quinone formation and tyrosinase in a model of Parkinson's disease. Neurotox Res 2003;5:165–76.

[20] Huang Y-Y, Chen AC-H, Carroll JD, Hamblin MR. Biphasic dose response in low level light therapy. Dose Response 2009;7:358–83. [DOI: 10.2203/dose-response.09-027.Hamblin]

[21] Sharma SK, Kharkwal GB, Sajo M, Huang Y-Y, De Taboada L, McCarthy T, et al. Dose response effects of 810 nm laser light on mouse primary cortical neurons. Lasers Surg Med 2011;43:851–9. [DOI: 10.1002/lsm.21100]

[22] Chang S-Y, Lee MY, Chung P-S, Kim S, Choi B, Suh M-W, et al. Enhanced mitochondrial membrane potential and ATP synthesis by photobiomodulation increases viability of the auditory cell line after gentamicin-induced intrinsic apoptosis. Sci Rep 2019;9:19248. [DOI: 10.1038/s41598-019-55711-9]

[23] Shen Q, Guo H, Yan Y. Photobiomodulation for Neurodegenerative Diseases: A Scoping Review. Int J Mol Sci 2024;25. [DOI: 10.3390/ijms25031625]

[24] Salehpour F, Farajdokht F, Erfani M, Sadigh-Eteghad S, Shotorbani SS, Hamblin MR, et al. Transcranial near-infrared photobiomodulation attenuates memory impairment and hippocampal oxidative stress in sleep-deprived mice. Brain Res 2018;1682:36–43. [DOI: 10.1016/j.brainres.2017.12.040]

[25] Rossato RC, Salles GR, Albuquerque AL, Porcionatto MA, Granato AEC, Ulrich H, et al. Photobiomodulation by LED 660 nm and Taurine against H(2)O(2) oxidative stress in SH-SY5Y cells. Lasers Med Sci 2025;40:211. [DOI: 10.1007/s10103-025-04467-y]

[26] Li X, Wang X-K, Zhu Z-J, Liang Z-W, Li P-H, Ma Y-G, et al. Photobiomodulation provides neuroprotection through regulating mitochondrial fission imbalance in the subacute phase of spinal cord injury. Neural Regen Res 2023;18:2005–10. [DOI: 10.4103/1673-5374.366491]

[27] Hamblin MR. Mechanisms and applications of the anti-inflammatory effects of photobiomodulation. AIMS Biophys 2017;4:337–61. [DOI: 10.3934/biophy.2017.3.337]

[28] Dos Santos Cardoso F, Mansur FCB, Araújo BHS, Gonzalez-Lima F, Gomes da Silva S. Photobiomodulation Improves the Inflammatory Response and Intracellular Signaling Proteins Linked to Vascular Function and Cell Survival in the Brain of Aged Rats. Mol Neurobiol 2022;59:420–8. [DOI: 10.1007/s12035-021-02606-4]

[29] Emdadul Haque M, Asanuma M, Higashi Y, Miyazaki I, Tanaka K, Ogawa N. Apoptosis-inducing neurotoxicity of dopamine and its metabolites via reactive quinone generation in

neuroblastoma cells. Biochim Biophys Acta 2003;1619:39–52. [DOI: 10.1016/s0304-4165(02)00440-3]

[30] Pike AF, Longhena F, Faustini G, van Eik J-M, Gombert I, Herrebout MAC, et al. Dopamine signaling modulates microglial NLRP3 inflammasome activation: implications for Parkinson's disease. J Neuroinflammation 2022;19:50. [DOI: 10.1186/s12974-022-02410-4]

[31] Lee E, Hwang I, Park S, Hong S, Hwang B, Cho Y, et al. MPTP-driven NLRP3 inflammasome activation in microglia plays a central role in dopaminergic neurodegeneration. Cell Death Differ 2019;26:213–28. [DOI: 10.1038/s41418-018-0124-5]

[32] Farazi N, Salehi-Pourmehr H, Farajdokht F, Mahmoudi J, Sadigh-Eteghad S. Photobiomodulation combination therapy as a new insight in neurological disorders: a comprehensive systematic review. BMC Neurol 2024;24:101. [DOI: 10.1186/s12883-024-03593-4]

[33] Matt SM, Nolan R, Manikandan S, Agarwal Y, Channer B, Oteju O, et al. Dopamine-driven increase in IL-1β in myeloid cells is mediated by differential dopamine receptor expression and exacerbated by HIV. J Neuroinflammation 2025;22:91. [DOI: 10.1186/s12974-025-03403-9]