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Epidemiological and Clinical Study of Crimean–Congo Hemorrhagic Fever in Cattle and Humans in Maysan Province, Southern Iraq

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Abstract:

Crimean-Congo hemorrhagic fever (CCHF) is a serious tick-borne zoonotic disease with significant public health concerns, particularly in regions like Europe, Asia, Africa, and the Middle East. In Iraq, sporadic outbreaks have been reported since 1979. This study examines the epidemiological and clinical characteristics of CCHF in humans and livestock in Maysan Province, Southern Iraq, focusing on the connection between human and cattle infections.

The study utilized a retrospective approach, analyzing 34 human cases and 45 cattle infections through hospital records, patient interviews, and serological tests (ELISA). Results showed a higher prevalence among females (61.76%), with housewives being the most affected group (55.88%). Fever, body pain, and hemorrhagic symptoms were common. Cases peaked between May and August, mainly in Amarah District. In cattle, 84.44% tested positive for IgG antibodies, indicating past exposure, and 15.56% for IgM antibodies, suggesting recent infections. Tick density was notably higher in communal grazing areas, correlating with human infection hotspots.

The study concludes that CCHF remains a significant threat in Maysan Province due to ecological and human-livestock interactions. Preventive strategies, including surveillance, public education, and tick control, are critical for reducing disease transmission. Further research is recommended to explore environmental and livestock roles in disease dynamics.

Keywords: Crimean-Congo hemorrhagic fever, zoonotic disease, tick-borne infections, public health, livestock reservoirs.

Introduction

Crimean-Congo hemorrhagic fever (CCHF) is a tick-borne zoonotic disease caused by a virus from the Nairoviridae family. It represents a critical public health challenge due to its wide geographic distribution, high fatality rate, and potential for outbreaks. The virus is primarily transmitted to humans via tick bites or direct contact with the blood or tissues of infected animals. Livestock, including cattle, sheep, and goats, serve as primary reservoirs for the virus, maintaining its transmission cycle through asymptomatic infections (1).

CCHF is endemic in multiple regions, including Europe, Asia, Africa, and the Middle East, with Iraq being one of the affected countries. Since its first documentation in Iraq in 1979, sporadic outbreaks have been reported, emphasizing the need for continuous surveillance and control measures. Environmental factors such as climate, agricultural practices, and livestock movement significantly influence the disease's spread. Over 20 tick species have been implicated as vectors, particularly those from the genus *Hyalomma*, which thrives in warm and humid environments (2).

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In Maysan Province, Southern Iraq, socioeconomic and ecological conditions have created a conducive environment for CCHF transmission. The region's reliance on livestock farming, combined with inadequate control of tick populations, presents a dual threat to human and animal health. Despite national campaigns to control tick infestations, CCHF remains a pressing concern, particularly during the warmer months when tick activity peaks.

This study examines the epidemiological and clinical characteristics of CCHF in humans and cattle in Maysan Province. It aims to elucidate the interplay between human and livestock infections, identify risk factors, and provide evidence-based recommendations for prevention and control. The findings underscore the necessity for integrated approaches to mitigate this zoonotic disease's public health and veterinary impacts.

Materials and Method

After permission was obtained from Al-Sader Teaching Hospital in Maysan province. The retrospective design was used to understand the incidence of CCHF in Maysan province. The present investigation used reported cases at Al-Sader Teaching Hospital. Through a comprehensive review of relevant literature, a questionnaire is constructed by the researchers for the study. It is comprised of two parts: the first part is concerned with Patients with CCHF demographic characteristics and the second part is comprised of items about standardized data collected on the features, clinical signs, multiple members of a household infected with CCHF Period of hospitalization, and number of deceased. All CCHF-reported cases were confirmed by ELISA test.

Results

Human Epidemiology: Out of 34 human cases, females (61.76%) were predominantly affected, with housewives representing the largest occupational group (55.88%). The median age was higher among females (42 years) compared to males (30.69 years). The overall hospital discharge rate was 97.05%, with a median hospitalization duration of 5 days, table (1).

Geographic and Seasonal Distribution: The disease incidence varied by the district where the incidence rates varied significantly across districts, ranging from 0.16 per 10,000 in Al-Maimouna to 0.48 per 10,000 in Al-Musharrah, and The highest number of cases was recorded in Amarah (21 cases), with an incidence rate of 0.30 per 10,000, table (2).

Clinical Features and Hemorrhagic Manifestations

The dominant clinical features of infected cases were fever (82.35%), generalized body pain (70.58%), fatigue (50%), nausea/vomiting (5.88%), and bleeding from multiple sites. The hemorrhage sites included epistaxis (61.67%), skin manifestations such as petechiae/ecchymosis (29.41%), and gingival bleeding (11.67%).

Distribution of CCHF-positive cases by month of onset

In the present investigation, all 34 confirmed cases of CCHF were reported between May and August 2023. The distribution of cases by month showed that 14 cases (41.17%) were recorded in June, while only 4 cases (11.76%) were recorded in August (Table 2, Fig. 1).

Table 1: Epidemiological Features of CCHF Confirmed Cases in Maysan Governorate.

Feature	Category	Frequency	Percent (%)
Sex	Male	13	38.23
	Female	21	61.76
	Median Age (Male)	30.69 years	-
	Median Age (Female)	42 years	-
Age Groups	10–20 years	6	17.64
	21–30 years	8	23.52
	31–40 years	7	20.58
	41–50 years	6	17.64
	51–60 years	2	5.88
	61–70 years	5	14.70
Occupation	Housewives	19	55.88
	Students	2	5.88
	Other	13	38.23
Period of Hospitalization	5 days	29	85.29
	7 days	4	11.76
	11 days	1	2.94
Multiple Household Infections	Yes	0	0.00
Hospital Discharge Rate	-	33	97.05

Table 2: Incidence of CCHF Confirmed Cases in Maysan Governorate by District.

District	Population	Total Cases	Incidence (per 10,000)	Total Deceased
Amarah	695,799	21	0.30	1
Al-Mejar Al-Kabir	143,898	5	0.34	0
Qal'at Saleh	70,000	3	0.42	0
Al-Musharrah	41,109	2	0.48	0
Al-Maimouna	61,898	1	0.16	0
Al Uzair	40,000	1	0.25	0

Table 3: The Clinical Features of Fatal CCHF Cases on Admission

Clinical Symptoms	Frequency	Percent (%)
Fever	28	82.35
General body pain	24	70.58
Fatigue	17	50
Nausea/vomiting	2	5.88
Epistaxis	21	61.67
Skin (Petechiae/Ecchymosis)	10	29.41
Gingival bleeding	4	11.67

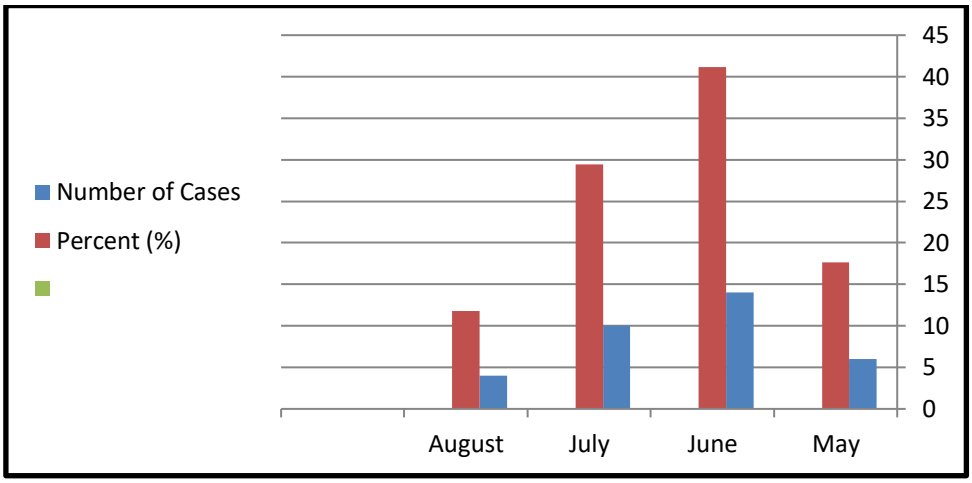

Figure (1): Monthly Distribution of CCHF Confirmed Cases.

Veterinary Findings

The study was conducted on 45 heads of cattle in Maysan Governorate infected with Crimean-Congo hemorrhagic fever (CCHF) virus, which was confirmed through serological tests (ELISA). These results confirm the role played by livestock as reservoirs for Crimean-Congo hemorrhagic fever virus within the ecosystem and facilitate its transmission to humans, (figure 2). Unlike humans, cattle infected with the CCHF virus typically display subclinical infections, with no overt symptoms. However, in this study, some animals exhibited mild fever, lethargy, and decreased milk production. These nonspecific signs make early detection challenging and emphasize the importance of routine veterinary surveillance. The results observed tick density was notably higher in cattle housed in communal grazing areas compared to those kept in isolated or controlled environments.

Geographic and seasonal patterns: The study showed that most of the infected cows were located in areas with a high infection rate among the population, such as Al-Mashrah and Al-Maimouna. The peak of infection coincided with the increase in seasonal tick reproduction in the seasons and warm weather, especially for the period between May and August.

Serological (ELISA) Results:

A serological test was performed using ELISA to detect IgG and IgM antibodies specific for CCHF in serum samples of 45 infected cows, where the results noted a significant positive reaction for IgG antibodies in 38 cows (84.44%) which may indicate previous exposure and possible viral circulation in the population, while the results revealed positive results for IgM antibodies in 7 cattle (15.56%) which indicates the presence of recent infection and active viral replication among cows. These results give an impression. The high prevalence of IgG antibodies highlights endemic viral activity in the region, while the presence of IgM antibodies underscores ongoing transmission during the study period.

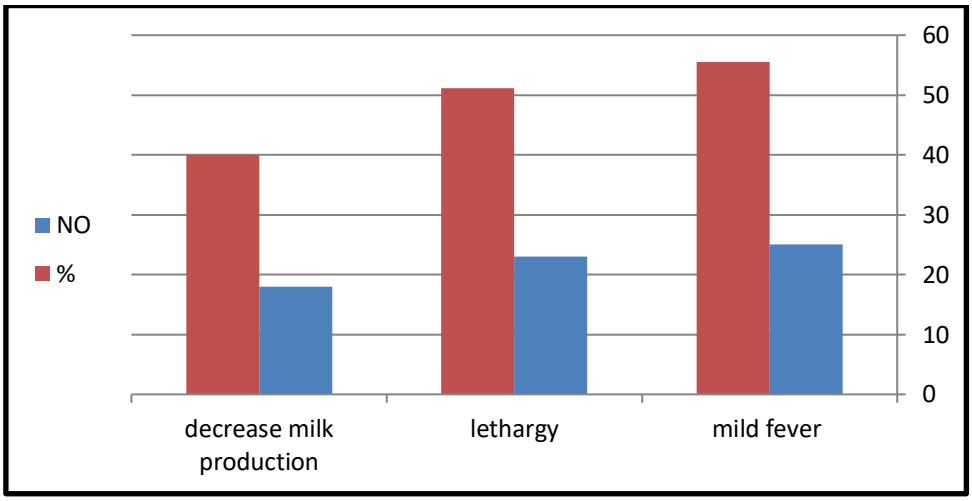

Figure (2): Clinical Observations in Cattle infected with CCHF Confirmed Cases.

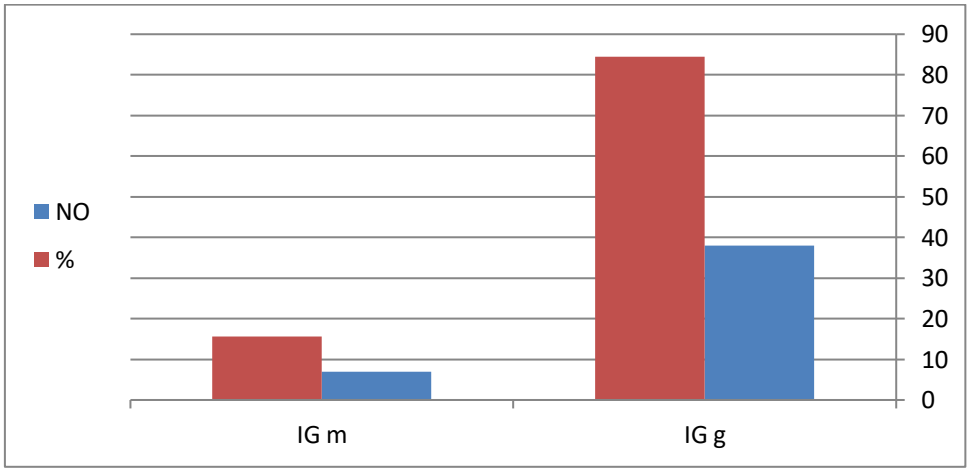

Figure (3): Serological test by using ELISA test to detect IgG and IgM antibodies in cows

Discussion

The study highlighted a significant gender disparity in Crimean-Congo Hemorrhagic Fever (CCHF) cases, with females (61.76%) being more affected than males (38.23%). This predominance aligns with global observations of higher exposure among women in rural settings due to their role in livestock care and household activities (1). The median age discrepancy, with females averaging 42 years compared to males at 30.69 years, further underscores the occupational exposure of adult women, particularly housewives, who formed the largest occupational group (55.88%). The high hospital discharge rate (97.05%) reflects effective clinical management, though the median hospitalization duration of 5 days emphasizes the necessity for prompt treatment. Interestingly, no multiple household infections were noted, which could be attributed to effective infection control measures or limited human-to-human transmission in this setting.

CCHF incidence was geographically variable, with the highest incidence rates in Al-Musharrah (0.48 per 10,000) and the highest case counts in Amarah (21 cases). These findings suggest localized endemic zones, potentially influenced by ecological factors such as tick density and livestock distribution (2). Seasonally, the concentration of cases between May and August correlates with tick activity during warmer months, a finding consistent with previous research on the seasonal dynamics of CCHF (3).

The dominant clinical fever (82.35%) generalized body pain (70.58%), and fatigue (50%)—are hallmark symptoms of CCHF (4). Hemorrhagic manifestations such as epistaxis (61.67%) and petechiae/ecchymosis (29.41%) highlight the disease's severity and potential complications. These findings reinforce the importance of rapid diagnosis and treatment to manage these life-threatening symptoms effectively.

The study's veterinary findings underscore the critical role of livestock as reservoirs for the CCHF virus. The high prevalence of IgG antibodies (84.44%) among cattle confirms endemic viral circulation, while the presence of IgM antibodies (15.56%) indicates active transmission during the study period. This dual serological evidence aligns with the notion that cattle serve as asymptomatic carriers, facilitating the virus's persistence and transmission within ecosystems (5). The observed higher tick density in communal grazing areas underlines the importance of tick control strategies. The geographic clustering of infected cattle in high human-incidence areas further supports the zoonotic transmission dynamics of CCHF (6,7).

Conclusion

CCHF remains a significant public health and veterinary concern in Maysan Province. The findings highlight the need for enhanced community awareness, strict livestock inspection protocols, and integrated tick control strategies to mitigate the spread of this zoonotic disease. Future research should focus on the role of livestock and environmental factors in shaping CCHF dynamics.

Recommendations

Routine serological testing of livestock and tick density monitoring are crucial for early detection and prevention of outbreaks. Targeted education for high-risk groups, such as housewives and livestock handlers, can mitigate exposure risks. Implementing tick control measures, particularly in communal grazing areas, is critical to reducing transmission. Resources should be allocated to high-incidence areas during peak tick activity seasons.

Conflict of interest: NIL

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References:

1. **Swanepoel, R., Burt, F.J., Leman, P.A., & Braack, L.E.O. (1998).** Epidemiology and ecology of Crimean-Congo hemorrhagic fever in southern Africa. *American Journal of Tropical Medicine and Hygiene*, 58(3), 269-278.
2. **Bente, D.A., Forrester, N.L., Watts, D.M., McAuley, A.J., Whitehouse, C.A., & Bray, M. (2013).** Crimean-Congo hemorrhagic fever: history, epidemiology, pathogenesis, clinical syndrome, and genetic diversity. *Antiviral Research*, 100(1), 159-189.
3. **Estrada-Peña, A., Palomar, A.M., Santibáñez, P., & Portillo, A. (2012).** Crimean-Congo hemorrhagic fever virus in ticks, Southwestern Europe, 2010. *Emerging Infectious Diseases*, 18(1), 179-181.
4. **Papa, A., Christova, I., Papadimitriou, E., Antoniadis, A., & Kouidou, S. (2011).** Crimean-Congo hemorrhagic fever in Bulgaria and Greece. *Emerging Infectious Diseases*, 10(12), 1724-1729.

5. **Whitehouse, C.A. (2004)**. Crimean-Congo hemorrhagic fever. *Antiviral Research*, 64(3), 145-160.
6. **Mertens, M., Schmidt, K., Ozkul, A., & Groschup, M.H. (2013).** The impact of Crimean-Congo hemorrhagic fever virus on public health. *Antiviral Research*, 98(2), 248-260.
7. **Yilmaz, G.R., Buzgan, T., Irmak, H., Safran, A., Uzun, R., Cevik, M.A., & Torunoglu, M.A. (2009).** The epidemiology of Crimean-Congo hemorrhagic fever in Turkey. *European Journal of Epidemiology*, 24(2), 123-131.