

The Outbreak of Crimean-Congo hemorrhagic fever (CCHF) in Al-Hsseiniya District /Karbala province in Iraq: A control strategy

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Abstract

Crimean-Congo hemorrhagic fever (CCHF) has been reported sporadically in Iraq during the last four decades, until 2022, when an aggressive outbreak hits several provinces. Two human cases have been reported in Al-Husseiniya District / Karbala Province (June and July 2022). Tick control on animals, backyards, and barns to reduce human CCHF cases. On October 2, 2022, an 8-day tick control campaign was organized in 65 villages in Al-Husseiniya district to apply pesticides to approximately 25,000 animals (cattle, buffaloes, sheep, and goats) and spray over 300,000 square meters of backyards and barns. In parallel, a public awareness campaign was carried out by distributing brochures to breeder families. Following the tick control campaign (from October to December 2022), there were no cases reported in Al-Husseiniya district/Karbala Province by the Ministry of Health (MoH). While for the same period, six cases were reported in the surrounding districts. About 912 families of animal breeders benefited from the campaign and were therefore protected from the risk of CCHF by reducing the tick population on their animals. The expense for treating each animal head and spraying one square meter of barns was \$0.005, equivalent to 88 Iraqi dinars. Spraying backyards, treating animals with pesticides, and increasing farmer knowledge can all lower the risk of CCHF in people. Nevertheless, more research is still required to determine which pesticides—such as biological, immunological, and integrated pest management, ovicidal pesticide—are the most successful. The study recommends the need to seek assistance from non-employed veterinarians in the future to contain and control (CCHF) disease, based on the success of this experiment.

Keywords: Tick control, acaricides, public health.

Introduction

Ticks are ectoparasite of livestock, wildlife, and humans, and are an important vector of viral pathogens (1). Arboviruses are viruses transmitted by arthropod vectors to different hosts, which are susceptible to causing diseases threatening public and animal health (2). The disease was initially identified as Crimean-Congo Hemorrhagic Fever (CCHF) after it was reported in the Crimea Peninsula in 1944-1945 (3) in Europe, and then later in Congo in 1956 (4). The global resurgence or introduction of vector-borne zoonotic illnesses demonstrates the link between health problems and potential financial losses brought on by vector-borne infections. There are over 900 kinds of ticks that may spread germs, viruses, and parasites (5). Ticks are distributed all over the world and inhabit a variety of biotopes (6). Being both a reservoir and a vector, the tick species *Hyalomma* is crucial to the epidemiology of CCHF both as a reservoir and a vector. Humans can become infected by tick bites, direct contact with an infected patient, or contact with body fluids or blood of viremic people and animals (7,8). The CCHF occurs in over 50 countries worldwide and is most probably transmitted by ticks on migratory birds or through international travel and trade of livestock and wildlife. CCHF infections are enzootic and mostly asymptomatic in various animals (9). During the period 1978-2019, 321 cases of CCHF were reported from Arab countries (9/22), Iraq (55 cases), Kuwait (18 cases), UAE (18 cases), Saudi Arabia (18 cases), Oman (88 cases), Sudan (34 cases), Egypt (4 cases), Tunisia (7 cases), and Mauritania 50 cases (10). The infection began to manifest in Turkey in 2002 around Tokat in the Black Sea region and spread to neighboring cities at first, but eventually spread throughout the country. In the following years, there was a rise in the cases, reaching its peak in 2008 and 2009, and then

reducing. However, nearly 900 new CCHF cases are now seen annually, and a total of 9,787 cases have been reported from 2002 through 2015, resulting in 469 deaths (4.79%) (11,12). The disease is endemic in Iran where it was first detected in the 1970s, a mortality rate approaching 20% in the year 2000 remarkably dropped to 6% in the year 2007 (13). In Iraq, the first case was reported in 1979 when a 24-year-old woman was diagnosed with CCHF at Al-Yarmouk Hospital in Baghdad. This case was followed by two other confirmed nosocomial cases, one physician and one health worker who subsequently died of the disease (14). Terrestrial animals such as cattle, sheep, and goats serve as amplifying hosts for this virus, especially in the warm summer months when tick populations are on the rise (15). In a serological survey of 2,205 animals in Iraq in 1980, Tantawi et al (1981) found a CCHF prevalence of 58% in horses, 57% in sheep, 49% in goats, 29% in cattle, and 23% in camel (16). In 2020, the general seroprevalence of CCHF in Mosul was obtained from the outcomes of the I-ELISA analysis. Altogether, 40 out of the 184 sampled cattle revealed positive results indicating a seroprevalence of 21.7% (17). In 2019, Serological evidence for CCHF infection in Mosul, included 23 of 120 sheep (19.16%) and 5 of 80 goats (6.25%) (18). Iraq has set an annual plan for more than five decades to prevent the disease and other tick-borne diseases (TBDs) by conducting spraying and dipping operations for all livestock and barns. The COVID-19 pandemic interrupted all disease prevention activities by the veterinary services leading to an abnormal increase of CCHF cases in humans in 2022, with 379 confirmed CCHF and 74 deaths during 2022 (19). This article briefly discusses the results of a tick control campaign in the Al-Husseiniya district that used pesticides on animals and backyard. A private team organized the campaign as part of a project sponsored by

Georgetown University in the United States of America.

Materials and Methods

Following the outbreak of CCHF in 2022, a project was developed to organize vector control operations in 65 villages in Al-Huseniya / Karbala by spraying pesticides on animals and in the environment (backyards and barns) to limit the spread of the CCHF outbreak. The project was designed in collaboration with the Ministry of Agriculture (Veterinary Directorate), the Ministry of Health (Communicable Diseases Center, CDC), and experts from Georgetown University through successive online meetings. Interventions focused on the Al-Husseiniyah District, which is situated 90 kilometers southwest of Baghdad, the capital of Iraq, and northeast of Karbala Province. The district coordinates are 32 40 23 N, 44 09 41 E.

The district has a population of approximately 133,000 people. The animal population consists of approximately 10000 cattle and 15000 sheep. There were two human cases of CCHF reported in the Al-Husseiniyah District in (case No. 5&7) June, and July- 2022, diagnosed by the Ministry of Health at the Central Public Health Laboratory(CPHL). There were 16 cases reported in Karbala province in 2022 including the two cases reported in the Al-Husseiniyah district as shown in (Table 1). The CCHF cases were confirmed by Altona Diagnostics RealStar R CCHFV RT-PCR Kit 1.0 produced by ZeptoMetrix Range MikroScan SL5 New Zealand. The test was carried out on blood and serum samples. At that time there were several challenges facing veterinary services, such as

the lack of pesticides, spraying equipment, dipping tanks, vehicles, and veterinary personnel. Georgetown University provided all the necessary supplies to make the campaign a success. Contracting ten modern pick-up cars and purchasing effective pesticides, sprayers, and personal protective equipment PPE. In addition to employing 33 employees (vets, drivers, spray workers, etc.) were hired from the private sector. All employees who participated in the campaign were given a one-day intensive training on biosafety and biosecurity aspects. The team leader educated breeders, especially women, on how to avoid disease, when dealing with raw meat and body fluids of animals and to take mitigating measures.

To cover the district during 8 days of operations from October 1st to October 8th, 2022, the campaign personnel were grouped into 10 teams of 3 people each. Each team received a car, PPE, and necessary accessories for sampling, and the pesticide ALPHARABI Deltamethrin 10% Pour-On of 500 ml (Damascus-Syria) for animals and Deltavet Pro 2. 5% of a 5-liter gallon (Meboadco-Jordan) pesticide for backyard spraying. Before spraying animals, the team leader examined the animals individually for the presence of ticks, enumeration, and marking the site of presence. Randomly collected ticks from animals were sent to the Iraqi Natural History Research Center and Museum/ University of Baghdad for species classification. The pesticide is poured on animals from neck to tail in addition to four limbs. At the same time, backyards are sprayed. Animals are examined later to check the efficacy of the pesticide by counting the remaining ticks still attached to the animal.

Table 1: The Health Department has reported cases of CCHF in Humans in Karbala Province 2022.

Patient sequence	Sex	Age	District	Occupation	Area	Date
1	M	22 Y*	Province Center	Butcher	Rural	26 April 2022
2	F	30 Y	Province Center	Housewife	Urban	01 May 2022
3	M	52 Y	Province Center	Mental Disable	Urban	14 May 2022
4	M	15 Y	Province Center	Poultry market	Semi-urban	30 May 2022
5	<u>M</u>	<u>13 Y</u>	<u>Al-Hussainyah</u>	<u>Student</u>	<u>Rural</u>	<u>09 June 2022</u>
6	M	42 Y	AL-Har	Driver	Urban	27 May 2022
7	<u>F</u>	<u>16 M**</u>	<u>Al-Hussainyah</u>	<u>Child</u>	<u>Rural</u>	<u>06 July 2022</u>
8	M	32 Y	Province Center	Butcher	Rural	20 June 2022
9	M	54 Y	Province Center	Marketing	Urban	02 August 2022
10	M	18 Y	Province Center	Butcher	urban	20 September 2022
11	M	14 Y	Province Center	Student	Urban	03 November 2022
12	M	28 Y	Jadol Grabi	Butcher	Rural	05 November 2022
13	M	47 Y	Al-Har	Meat processing	Urban	11 November 2022
14	M	36 Y	Province Center	Military	Semi-urban	22 November 2022
15	M	07 Y	Al-Har	Child	Urban	30 November 2022
16	M	22 Y	Province Center	Butcher	Urban	25 December 2022

Y*: Year

M**: Month

Results

The campaign covered 65 villages with more than 10,000 heads of cattle and buffaloes, 15,000 heads of sheep and goats, more than an official census from the local veterinary authority, and 368,000 square meters were sprayed on barns. A total of 912 families of animal breeders benefited from the campaign and were therefore protected from the risk of CCHF by reducing the tick population (Table 2).

The expense for treating each animal's head and spraying one square meter of the barn was

\$0.005, which is equivalent to 88 Iraqi dinars. It was noted that in Karbala during the period October–December 2022, no human cases of CCHF were reported in the Al-Husseiniya district. While six cases were reported in other districts of Karbala (Table 1). The effectiveness of the pesticide was to kill the entire tick population during animal checking after the pesticide application. Identification or classification of ticks collected by vet teams was carried out by the Iraqi Natural History Research Center and the Museum/University of Baghdad, as *Hyalomma (anatolicum, excavatum, impeltatum)*, is a well-known species and was previously registered in Iraq.

Table 2: Overall Results of the Al-Husseiniya District Vector Control Campaign

Day	Village	Owners	Cattle &Buffalos	Sheep &Goats	Others*	Backyards M2
1 st	8	82	429	464	67	20705
2 nd	8	97	989	2413	56	34175
3 rd	8	124	1634	1712	67	54652
4 th	8	137	1384	1840	13	56295
5 th	8	133	1929	2790	0	78290
6 th	8	127	1549	3730	7	61353
7 th	9	118	2017	1557	0	60200
8 th	8	92	744	682	2	29650
Total	65	912	10675	15188	212	368520

*Others include: Horses, camels, donkeys, dogs

Discussion

The CCHF disease poses a risk both to public health and animal wealth. This study showed that the risk of CCHF in humans can be reduced by applying pesticides to animals, spraying the backyard, and raising awareness among farmers. However, further exploration of the most effective pesticides, including biological, immunological, and integrated pest management, is still needed. The most important conclusion of this study is to demonstrate to decision-makers in Iraq the benefit of engaging private unemployed veterinarians in disease and vector control operations through specific arrangements such as the principle of Public-Private Partnership (PPP) adopted by the World Organization for Animal Health(WOAH).

Due to the widespread presence of ticks in livestock herds and barns, the study recommended taking precautionary measures. A single adult female tick is capable of depositing up to 3.000 eggs or more in the environment (20). This requires the introduction of pesticides that act as ovicides,

preventing the eggs from hatching, not depending only on tickcide or larvicide. The study recommends conducting a study to examine and classification of ticks found in Iraq because there is a chance that new species might be introduced by imported animals. Chemical methods are not the sole means of controlling ticks in livestock populations. They should be accompanied by awareness campaigns targeting farmers and their families. The study recommends that livestock breeders might raise domestic chickens within their flocks as predators of livestock ticks and that chickens may be used as part of an integrated tick control plan to reduce environmental pollution (21). Knowing that chickens do not get hemorrhagic fever (22).

conclusions

The study demonstrates that the cost of spraying animals or backyards is extremely low. To contain CCHF in Iraq, it's simple to provide the necessary budget for such an activity and use the network of private veterinarians.

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تفشي حمى القرم-الكونغو النزفية في قضاء الحسينية / محافظة كربلاء في العراق: استراتيجية المكافحة.

باسم نجم العضاض

فرع طب الاسرة والمجتمع، كلية الطب / الجامعة المستنصرية / بغداد – العراق.

الخلاصة

مرض حمى القرم – الكونغو النزفية سجل في العراق خلال الاربعة عقود المنصرمة بإصابات قليلة, حتى عام 2022 حصل تفشي عدواني شديد اجتاح العديد من المحافظات العراقية, وسجلت حالتين في قضاء الحسينية ضمن محافظة كربلاء خلال شهري حزيران و تموز/ 2022. للسيطرة على القراد الناقل المتواجد على الحيوانات وفي الحضائر بهدف تقليل الاصابات البشرية. اقيمت حملة احتواء للمرض في القضاء المذكور اعلاه للفترة من 2-8 تشرين اول 2022 شملت 65 قرية لمعالجة 25 الف راس من الابقار والجاموس و الاغنام و الماعز مع رش اكثر من 300 الف متر مربع من الحضائر باستخدام المبيدات. رافق عمليات رش المبيدات القيام بحملة توعية لعوائل المربين بتوزيع كتيبات توعية. لم تسجل اية اصابة بالحمى النزفية في الحسينية طيلة ثلاثة اشهر من تشرين اول – كانون اول 2022 بينما سجلت الاقضية المحيطة بالحسينية 6 اصابات بالمرض اعلاه حسب النشرة الرسمية التي تصدرها وزارة الصحة لعراقية. من مخرجات حملة الاحتواء حماية 912 عائلة من خطر الاصابة بالمرض بسبب تقليل الكثافة العددية للعامل الناقل للمرض على الحيوانات و في الحضائر. تم احتساب كلفة رش الراس الواحد و رش المتر لمربع الواحد من الحضائر وكانت \$0.005 اي بما يعادل 88 دينار عراقي. التوصية بضرورة البحث عن مبيدات تعمل على قتل بيوض القراد وعدم الاكتفاء بمبيدات قتل اليرقات او الحشرة الكاملة, وادخال الادارة المتكاملة للآفات. وتوصي الدراسة بضرورة الاستعانة بالأطباء البيطريين الغير معينين مستقبلا في مواجهة مرض الحمى النزفية اعتمادا على نجاح هذه التجربة.

الكلمات المفتاحية: السيطرة على القراد، مبيدات القراد، الصحة العامة.