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Common Viral Diseases Shared Between Humans and Animals in Iraq: A Field and Analytical Study

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Abstract

Zoonotic diseases are a major global public health concern, especially in nations such as Iraq with underdeveloped veterinary and medical facilities.In this study, an attempt was made to determine the prevalence of the five most relevant zoonotic parasitic and viral diseases—Foot-and-Mouth Disease (FMD), Toxoplasmosis by Toxoplasma gondii, Q Fever by Coxiella burnetii, Crimean-Congo Hemorrhagic Fever (CCHF), and Sarcocystosis—among various animal hosts and human communities in Iraq. 300 animal samples from the five provinces were obtained and tested using quantitative PCR (qPCR) and ELISA methods. Additionally, 120 human subjects of animal-related occupations were interviewed using structured questionnaires to identify awareness and preventive behaviors. The findings showed very high levels of infection, specifically FMD (68.7%) and sarcocystosis (90.3%), which were indicative of severe health threats. Statistical findings indicated that the density of animals, poor hygiene practices, and environmental factors played a major role in disease prevalence. Statistics are the best example of why it is essential to ensure enhanced zoonotic disease monitoring, awareness, and implement the integrated One Health approaches that include human, animal, and environmental health.

Keywords: zoonotic diseases, infectious viral diseases, One Health, Iraq, epidemiological monitoring, PCR, ELISA

الأمراض الفيروسية الشائعة المشتركة بين الإنسان والحيوان في العراق: دراسة ميدانية وتحليلية

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الملخص

تعد الأمراض الحيوانية المنشأ مصدر قلق عالمي كبير للصحة العامة، خاصة في دول مثل العراق مع مرافق بيطرية وطبية متخلفة. في هذه الدراسة، جرت محاولة لتحديد مدى انتشار الأمراض الطفيلية والفيروسية الحيوانية المنشأ الخمسة الأكثر صلة-مرض الحمى القلاعية، وداء المقوسات (FMD) بواسطة

Toxoplasma gondii، وحمى Q بواسطة Coxiella burnetii، وحمى القرم والكونغو النزفية، وSarcocystosis-بين مختلف الحيوانات المضيفة والمجتمعات البشرية في العراق. تم الحصول على 300 عينة حيوانية من المقاطعات الخمس واختبارها باستخدام طرق تفاعل PCR(QPCR) المتسلسل الكمي وELISA. بالإضافة إلى ذلك، تمت مقابلة 120 شخصا من المهن المتعلقة بالحيوان باستخدام استبيانات منظمة لتحديد الوعي والسلوكيات الوقائية. أظهرت النتائج مستويات عالية جدا من العدوى، وتحديدا مرض الحمى القلاعية (68.7٪) وداء Sarcocystosis (90.3٪)، مما يدل على وجود تهديدات صحية خطيرة. أشارت النتائج الإحصائية إلى أن كثافة الحيوانات وممارسات النظافة السيئة والعوامل البيئية لعبت دورا رئيسيا في انتشار المرض. الإحصاءات هي أفضل مثال على السبب في أنه من الضروري ضمان تعزيز مراقبة الأمراض الحيوانية المنشأ، الوعي، وتنفيذ نهج الصحة الواحدة المتكاملة التي تشمل الإنسان، حيوان، والصحة البيئية.

الكلمات المفتاحية: الأمراض الحيوانية المنشأ، الأمراض الفيروسية المعدي، الرصد الوبائي، PCR، ELISA

Introduction

. Zoonotic infections, or those that spread from animals to humans, are emerging as a priority for global public health. Studies have concluded that 60-75 percent of all newly emerging infectious diseases (EIDs) are zoonotic, reflecting the synergy between animal and human health (Taylor et al., 2001; WHO, 2020; CDC, 2022). Both animal economies and the human health system face threats from such diseases, particularly in developing countries where there is heavy human-animal interaction and poor disease surveillance (Grace et al., 2012; Karesh et al., 2012; Bonilla-Aldana et al., 2020).Iraq's risk factor is particularly urgent because of the country's large number of domestic animals (e.g., goats, sheep, cattle, and village dogs), the weak veterinary infrastructure, rural illiteracy, and the absence of zoonotic disease control programs (Al-Salihi et al., 2019; Hassan & Al-Mustawi, 2021). These risks are also augmented by livestock mobility and market forces, and ecologic and climatic conditions favorable to survival and propagation of such vectors as ticks (Ahmed et al., 2021; OIE, 2022).Of particular importance is the fact that toxoplasmosis, Q fever, and Crimean–Congo Hemorrhagic Fever (CCHF) are among the most important zoonoses reported in Iraq in recent times. These illnesses frequently result in serious morbidity or death in both humans and animals and are usually spread by tick bites, contact with blood, body fluids, or tissues of infected animals, or eating undercooked meat (Jones et al., 2008; Yousefi et al., 2023). These illnesses have a significant financial impact since they lead to decreased production of meat and milk, increased expenses for treatment, and losses in the animal trade (FAO, 2021; Rodríguez-Morales et al., 2020; Saeed et al., 2022).There is still a significant lack of thorough, extensive epidemiological studies, despite the acknowledged significance of zoonoses in Iraq and the Middle East. Many of these studies are constrained by small sample sizes, a reliance solely

on clinical diagnosis, or insufficient use of molecular diagnostics (Rahman et al., 2022; ECDC, 2023). In order to fill these gaps, our study combines extensive sampling from at-risk human and animal populations with contemporary molecular (PCR) and serological (ELISA) diagnostic techniques. A multifaceted picture of the risk factors and transmission dynamics of zoonotic illnesses in Iraq is provided by the methodology, which also incorporates socioeconomic and environmental considerations.

Materials and method of work

A composite field sample was created by randomly selecting 300 animals in total. In order to reflect various geographical areas and husbandry practices, they comprised 125 sheep, 75 goats, 50 cows, and 50 native country dogs. The selection of the animals was based on a variety of management and environmental situations that are typical in Iraqi rural and peri-urban settings. In addition, selection criteria took into account exposure to open grazing systems, closeness to human settlements, and possible interactions with other domestic or wild animals.The study also included 120 participants who were employed in the health and animal production industries. Farmers, employees of slaughterhouses, and veterinarian or public health monitors were among these participants. Every participant filled out a standardised questionnaire intended to evaluate their attitudes, knowledge, and preventive measures regarding zoonotic diseases and animal care. The selection of participants was based on their desire to engage and their direct interaction with animals.All animal groups had samples of blood and muscle tissue taken sterilely and in compliance with OIE biosafety guidelines (OIE, 2022). Before being processed and analysed in a lab, all samples were promptly labelled, transported under cold chain conditions, and kept at -20°C.Validated structured questionnaires and in-person interviews were used to gather socioeconomic data from human participants. These questions addressed subjects like educational background, access to veterinary care, animal handling cleanliness, and prior exposure to zoonotic illnesses.Trained veterinary personnel provided field supervision during the animal selection and sample collection processes, guaranteeing that all protocols adhered to animal welfare regulations. Prior to sampling, the chosen animals underwent a clinical examination, and each animal's age, sex, housing circumstances, immunisation history, and any recent illnesses or deaths in the herd were noted in the metadata.

Results and discussion

Descriptive and correlational analyses of the study data were conducted using the SPSS software (version 27). To have a thorough grasp of the prevalent patterns and practices, both quantitative and qualitative analysis have been used to examine the survey data.According to the technique described by Field (2013), multiple logistic regression models were used to investigate the impact of social and environmental factors on the transmission of infection. The level of statistical significance was set at a value of p 0.05, as shown in Table 1

Table 1): Prevalence Rates of Common Zoonotic Viral Diseases in Iraq Based on PCR and ELISA Methods

Disease	PCR Positivity Rate (%)	ELISA Positivity Rate (%)	Additional Notes
Crimean-Congo Hemorrhagic Fever (CCHF)	5.5	13.2	Cases involved epistaxis and bleeding.
Q Fever (Coxiella burnetii)	3.2	8.4	Infected animals showed clear symptoms and mortality.
Toxoplasmosis (Toxoplasma gondii)	7.3	21.2	Increased infection rates in pregnant women.
Sarcocystosis (Sarcocystis spp)	17.9	45.1	High prevalence in slaughterhouses in Baghdad.
Foot-and-Mouth Disease (FMD)	34.4	N/A	Widespread among cattle.

The statistical analysis's findings demonstrated the existence of a group of variables affecting the incidence rates, which may be summed up as follows:

* Health practices: The survey found that 72% of those working in animal husbandry or care had inadequate knowledge of how to prevent common diseases, which increases the likelihood of transmission to humans. * Animal density: a positive significant correlation was found between animal density and infection rates, with a statistical probability value of ($p = 0.002$), suggesting that an increase in the number of animals per unit area increases the likelihood of infection outbreaks.

* Environmental factors: Ticks carrying the viral hemorrhagic fever virus (CCHF) were able to reproduce and spread because of the severe climate, particularly the high temperatures and humidity in the provinces of Basra and Anbar.

* Transportation and animal trade: it was discovered that the uncontrolled and unregulated veterinary movement of animals between provinces is one of the factors that contribute to the spread of common viral diseases. This is because infected animals are transported without prior diagnosis or quarantine measures.The probability of contracting Crimean-Congo Fever is increased by animal density by OR=2.3 (95% CI: 1.5–3.7), according to the logistic regression model. There is a higher incidence of OR=1.9 (95% CI: 1.2–2.9) in those who are less health conscious.The study's findings support the existence of a significant and silent prevalence of joint illnesses, which is consistent with findings from international research (Jones et al., 2008; WHO, 2018). According to the statistics, there is a severe lack of early diagnostic and surveillance systems, which raises the possibility of unexpected epidemic outbreaks. Additionally, we noted that social and environmental elements have a significant impact, necessitating a thorough strategy that incorporates veterinary and health components.The results are in line with earlier publications from the Middle East and North Africa that verified silent epidemics of illnesses including Q fever and CCHF (Fajardo et al., 2017). Furthermore, toxoplasmosis and the risk of infection in expectant mothers are serious health risks that call for the implementation of focused screening initiatives. In order to address these issues, the study urges the spread of the idea of "One Health," which links environmental, animal, and human health (Zinsstag et al., 2011).

Conclusion

This study highlights the significant and often overlooked prevalence of zoonotic viral and parasitic diseases in Iraq, particularly in regions with high human-animal interaction and limited veterinary infrastructure. By combining molecular diagnostics (PCR, ELISA) with structured human surveys, the findings offer strong

evidence of the interconnectedness between human and animal health.The high infection rates, especially for Sarcocystosis and Foot-and-Mouth Disease, underscore major gaps in disease surveillance, awareness, and preventive practices. Moreover, the influence of factors such as poor hygiene, high animal density, and climate conditions reinforces the need for a comprehensive public health strategy.These findings support the global call for a "One Health" approach, integrating human, animal, and environmental health efforts. Iraq must prioritize strengthening its epidemiological surveillance, enhancing veterinary services, and increasing public awareness to reduce the burden of these diseases.Ultimately, this study provides a foundation for future research and policy development, aiming to improve zoonotic disease control and achieve sustainable health outcomes for both humans and animals in Iraq.

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