Seroprevalence of 2 zoonotic diseases in Southwestern Saudi Arabia. *Rift Valley fever and brucellosis*

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Rift Valley fever (RVF) is an arthropod-borne viral disease characterized by high mortality rates in young animals and abortions in pregnant ruminants.[1] The virus is transmitted to humans through mosquito bites, or by exposure to blood and bodily fluids.[1,2] Epidemics of RVF were limited to the African continent until the year 2000, when an epidemic occurred simultaneously in southwestern Saudi Arabia, and the neighboring north-western regions in Yemen.[3] Even though no clinical cases of RVF among humans were reported from regions outside the epicenters in the Kingdom of Saudi Arabia (KSA), there is always a concern on the possibility of spread of this infection to other regions.[3]

Brucellosis is an infectious disease caused by bacteria of the genus *Brucella* that cause significant economic losses for animal owners, and severe human disease.[4,5] *Brucella* can survive for long periods in dust, dung, water, aborted fetuses, soil, meat, and dairy products. As the infection dose is very low, infections are an occupational risk for farmers, veterinarians, abattoir workers, laboratory personnel, and others who work with animals, and consume their products. Infection is transmitted to humans through direct contact with the infected animals, or by consuming infected milk or fresh cheese, and undercooked meat products.[4,5] Continuous monitoring programs allow the evaluation of the current status of RVF and *brucellosis*' prevalence, and help in the effectiveness of control measures. Although many studies have been carried out on RVF[2,3] and *brucellosis*[4,5] in KSA, there is a clear need for new studies on the seroprevalence of these diseases in Najran region. The objective of this work is to investigate the prevalence of RVF and *brucellosis* in Najran region.

Blood samples were collected from humans and animals in Najran region from September 2009 to June 2010. The human blood samples were collected from 2 groups. The first group consists of 540 apparently healthy people with a high-risk of contracting *brucellosis* (farms and abattoir workers). Informed consent was obtained from the participants. A 5 ml sample of peripheral venous blood was collected from subjects at their place of employment. In the second group, blood samples were collected from 900 patients, suffering from fever, of different ages and gender at King Khalid Hospital in Najran. The animal samples (sheep and goats) were collected from the 2 groups: first group - 640 sheeps and 320 goats from different unvaccinated flocks with a history of abortions; and the second group - 450 blood samples were collected from healthy slaughtered sheep (n=300) and goats (n=150) from the Najran abattoir.

Blood samples were transported to the laboratory on ice, where they were centrifuged, and the sera were separated. Humans and animals sera were tested by indirect enzyme-linked immunosorbent assay (ELISA [Biological Diagnostic Supplies Limited, UK]) for immunoglobulin (Ig) M, and IgG antibodies against RVF virus. Human sera were tested by indirect ELISA (Laboratorios Vircell, Granada, Spain) for IgM and IgG antibodies against *brucellosis*. Animals sera were tested by slide agglutination test (SAT) for antibodies using stained bacterial antigen (Omega Diagnostic Ltd Carsbridge Court, Alloa, Scotland, UK), and the *Brucella* was considered positive when a titer of ≥1:160 was obtained. All tests were carried out at Biosafety Level 3 at Najran University, Najran, KSA, and were performed according to the manufacturer's instructions. This study was approved by the Research and Ethics Committee of the College of Medicine, Najran University, Najran, KSA.

All human and animal tested samples were negative for anti-RVF virus IgM and IgG antibodies. For *brucellosis*, the results of ELISA revealed that all apparently healthy people samples were negative for IgM antibodies, while 12 were positive for IgG antibodies. Thirty of the feverish patient's sample were positive for IgM antibodies, while 66 were positive for IgG antibodies. The results of SAT revealed that 96 of diseased sheep samples, 46 of diseased goat samples, and 2.7% of healthy slaughtered sheep and goat samples were positive against *Brucella melitensis* antibodies. **Table 1** summarizes the results of *brucellosis* test.

Rift Valley fever virus can establish itself wherever potential permissive vectors and animal reservoirs are present. The presence of competent vectors in regions previously free of RVF, the high viral titers in viremic animals, as well as the global changes in climate, travel and trade all contribute to make this virus a threat that must not be neglected.[1] Najran region is a rural area where the main occupations of the population include animal husbandry, and the climate favors breeding of mosquitoes. The results showed that all humans and animals tested samples were negative against RVF IgG and IgM antibodies. Our results agree with many studies performed in different localities in KSA, and indicated that the disease is still localized in the area of

Table 1 - *Brucellosis* results in human and animal.

Species	Total samples	Positive samples	(%)	Test
Human				
Apparently healthy	540	0	(0.0)	ELISA IgM
		12	(2.2)	IgG
Patients	900	30	(3.3)	ELISA IgM
		66	(7.3)	IgG
Sheep				
Diseased from farms	640	96	(15.0)	SAT
Apparently healthy from abattoir	300	8	(2.7)	SAT
Goat				
Diseased from farms	320	46	(14.3)	SAT
Apparently healthy from abattoir	150	4	(2.7)	SAT

ELISA - enzyme-linked immunosorbent assay, Ig - immunoglobulin, SAT - slide agglutination test

Jizan.[2,3] Despite its control in many developed countries, *brucellosis* remains endemic in KSA. In this study, we investigated the prevalence of *brucellosis* in humans and animals to follow up the latest situation in Najran region. The results revealed the prevalence of both human and animal *brucellosis* with an infection rate ranging from 7.3% in diseased humans to 15% in diseased animals. Furthermore, the results revealed the prevalence of both acute and chronic *brucellosis* in Najran region as shown from IgM and IgG results. Our results agree with a previous work that indicated that the prevalence of *brucellosis* in animals in KSA is approximately 15%.[5] However, our results disagree with other studies, which indicated the incidence rate of *brucellosis* in humans in KSA ranges from 0.034-0.040%.[4] The differences in the results may be due to the time and area of investigation. The actual prevalence of *brucellosis* may be higher than that indicated by antibody screening. The gold standard in *brucellosis* remains the isolation of *Brucella*. Our work would have been stronger and more credible if we had carried out the ELISA test for animal samples, and isolated the *Brucella* microorganism.

In conclusion, Najran region is free from RVF and endemic of *brucellosis*. Continued surveillance and efforts are needed to further decrease the cases of *brucellosis*, and to prevent the introduction of RVF to Najran region.

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