Seroprevalence of Coxiella burnetii among cows and sheep in Thi-Qar province -Iraq.

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Abstract

The aim of this study is detecting antibodies of phase I and phase II of Coxiella burnetii bacterium, the cause of Q-fever, a zoonotic diesase in humans and animals in Thi-Qar province.Out of 393 serum samples collected randomly from Thi-Qar province from aborted and non aborted cows and ewes, the results appeared that 29 (7.37%) samples of cows and ewes were seropositive for C. burnetii distributed as 16 seropositive samples of 172 cows (9.3%) and 13 seropositive samples of 221 sheep (5.8%).the most positive cases associated with abortion cases with ratio (92.3%) in ewes and (75%) in cows.

Introduction

Q.Fever is a zoonotic disease first identified in Queensland Australia in 1935 after an outbreak of febrile illness among slaughterhouse workers [1] the disease was named "Query (Q)" fever because it's etiopathogenesis was not known..([2, 3] .Q fever is a disease caused by an obligate intracellular bacterium, C.burnetii. This disease is endemic worldwide [3,4] C. burnetii is a gram-negative coccobacillus that resides and replicates in host monocytes and Macrophages.[8].In the host, C burnetii has an affinity for placenta, and concentrations as high as 109 ID50 (the infectious dose sufficient to infect 50% of those exposed) have been reported per gram of placental tissue ,The C. burnetii is shed in birthing fluids and membranes,[7] as well as milk, urine, and feces, and infection is typically acquired through the inhalation of the organism in fine-particle aerosols.Coxiella burnetii infections have been reported in humans, farm animals, pets, wild animals, and arthropods [4]. Animals are often naturally infected but usually do not show typical symptoms of C. burnetii infection [3,5]. Ticks are considered to be the natural primary reservoir of C. burnetii and responsible for the spread of the infection in wild animals and for transmission to domestic animals [4]. Cattle, sheep and goats are the main sources of human infection [5].Infected animals shed highly stable bacteria in urine, feces, milk, and through placental and fetal fluids. Infection via inhalation of aerosolized organisms or ingestion of raw milk or fresh dairy products has been reported in humans and animals [6]. In humans, Q fever is most often asymptomatic, but acute disease (mainly a limited flu-like illness, pneumonia or hepatitis) or chronic disease (chronic fatigue syndrome or endocarditic) can occur [3]. Acute Q fever is a flu-like illness, which is self-limiting or easily treated with antibiotics when an appropriate diagnosis is made.Cattle are often naturally infected but usually do not show typical symptoms of C. burnetii infection. Clinical signs of C. burnetii infection are abortion in sheep and goats, and reproductive disorders in cattle. C. burnetii can be isolated from the blood, sera, lungs, spleen, and liver of infected animals in the acute phase of the disease. The uterus and mammary glands are the primary sites of infection in the chronic phase of C. burnetii. Shedding of C. burnetii into the environment occurs mainly during parturition by birth products, particularly the placenta of sheep. In addition, shedding of C. burnetii in milk by infected dairy cattle is well documented [3,5].C. burnetii is highly infectious; only one organism is required to produce infection under experimental conditions [7]. C. burnetii is currently considered a potential warfare agent and is classified as category B biological agent by the Center for Diseases Control and Prevention. Routine diagnosis of Q fever

is usually based on the detection of specific antibodies by complement fixation, and immunofluorescence and enzyme-linked immunosorbent assay (ELISA) tests. Isolation of C. burnetii is hazardous, difficult and time-consuming, and requires confined biosafety level 3 laboratories due to the zoonotic nature of the microorganism [9]. Rapid differentiation of C. burnetii in clinical specimens is very important for the control of Q fever, because prompt antibiotic therapy may lead to a better prognosis for individuals [8].

Materials and methods

A total of 393 serum samples (5 ml of blood inspirited and putted in racks at room temperature to complete clotting. The serum was separated 24 h after sampling and stored at -20°C until tested), of animals (cows and ewes) collected randomly from Thi -qar province submitted to ELISA(Enzyme-linked immunosorbent assay) test (Institut pourquier), identify specific antibodies (IgG) of phase I and phase II of Coxiella burnetii bacterium .the samples from both animals are divided into aborted and non aborted groups.All works were done in microbiology laboratory of veterinary hospital - Thi-Qar province.

Table 1.No. of animals submitted to sampling.

Animal spp.	Aborted	Non aborted	Total
COWS	122	50	172
Sheep	176	45	221

Results

The results revealed that 29 (7.37%) samples of cows and ewes were seropositive for Coxiella burnetii distributed as 16 seropositive samples of cows(9.3%) and 13 seropositive samples of sheep(5.8%) (Table 2).

Table 2 . The percentages of C. burnetii infection in cows and ewes.

Animal spp.	Cows	Ewes	Total
+v	16	13	29
Total samples	172	221	393
Percentages	9.3%	5.8%	7.37%

The results also revealed that 12 from 13 (92.3%) ,1 from 13 (7.1%) seropositive samples for Coxiella burnetii in aborted and non aborted ewes respectively (Table 2).

Table 3.Distribution of C. burnetii infection in aborted and non aborted ewes and cows.

Result	Aborted		Non aborted		Total	
sheep	No.	%	No.	%	No.	%
+ ve	12	92.3	1	7.1	13	5.88
Cows						
+ ve	12	75	4	25	16	9.31

Also results revealed that 12 from 16(75%) ,4 from 16(25%) samples were seropositive for Coxiella burnetii in aborted and non aborted cows respectively (Table 3).

Discussion

The results show the epidemiology and the prevalence of C.burnetii in the tested animals where the ungulate mammals (sheep, cattle ,goats) consider

the main reservoirs and the most important source of infection for human and other animals [10-13-11-12].The results of our study is similar to many studies from which (9.56%) of Turkey cattle have antibodies against C.burnetti [28] and (10.75%) in the cattle of Iran[27] (8.53%) in of Bulgarian cattle [26] while the the ratio of Q fever in sheep(ewes) (5.8%) show difference with the other studies from which(11.5%) that done on Bulgarian sheep[26] and (16.5%) in American sheep[31] (35%) of sheep flocks in Omafra[29] (40%) in Neuvo Leon[30]. From results note that the infection with Q. fever generally is low 5.8% and 9.3% in sheep and cows respectively,low infection recorded in other area in the world, the prevalence of 1.1% to 3.9% of C.burnetii infection was reported in cattle of U.S.A [14] while other studies show that 3.4% in cattle of same country [15] high percentage of infection recorded in Canada 67% of 200 dairy herds(cattle and sheep) were ELISA-positive for antibodies of C .burnetii[16] 57% of cattle blood samples were positive to ELISA test in Slovenia [17] and 50.3% in peoton sheep (U.S.A) [18] and 56.86% in sheep of Bulgaria [19].Seroprevalence of C.burnetii show differences in the ratios of infection and this may due to that the most survies to Q. fever is based mainly on serological techniques especially ELISA test so the results depending on the testing methods in addition to the year of survey (eg.the seroprevalence of Q.fever in Wisconsin was 33% in 1957 but was 73% in 1962 [20]) , in addition the type of samples collection and method of survey also play important role in the results while the animal samples in this study was taken randomly from healthy aborted and non aborted animals. Other cause of low C. burnetii infection in our study may due to the wide used of tetracycline antibiotic in veterinary medicine where is consider the important and the main drug for treat several pathogenic causes and diseases in veterinary medicine according to the veterinarians sources where the C.burnetii is very sensitive to the tetracycline and their derivatives [21]. . The treatment of ruminants herds with tetracycline is very effectiveness in herds that Q. fever is enzootic and this prophylactic treatment is used to minimize shedding of the organism in placenta and birthing fluids rather than to eliminate infections.[22]. From the table (3) note that the most positive cases of Q. fever is associated with aborted cases as (92.3%) in aborted ewes and (75%) in aborted cows while Q. fever disease is highly associated with reproductive problems(abortion ,infertility ,metritis, mastitis…) in cattle and sheep [23] . Abortion is the clinical manifestation of widespread occurrence of C.burnetii in animal populations and is mainly concentrated during their reproductive seasons of small ruminants [24-25].In conclusion, the result of this study confirm the prevalence of anti- C.burnetii antibodies in Thi-Qar province, the data obtain from this study may be useful for reference in further studies in Thi-qar province or Iraq .Further studies, in collaboration between veterinary and medical services, on coxiella infection in both domestic animals and human are needed to elucidate the epidemiology of Q fever in Iraq.

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الخلاصة

هدفت الدراسة الحالية للكشف عن أضداد جرثومة بطوريها الأول والثاني المسببة لمرض الحمى المجهولة في الحيوانات حيث يعد المرض مشتركا بين الإنسان والحيوان ومنتشر عالميا.أظهرت نتائج الفحص المصلي باستخدام فحص الاليزا غير المباشر، على ٣٩٣ عينة مصل جمعت عشوائيا في محافظة ذي قار من نعاج وأبقار مجهضة وغير مجهضة ،ان ٢٩(٧.٣٧%) من العينات كانت موجبة لأضداد الجرثومة موزعة بواقع ١٦ عينة أبقار وبنسبة (٩.٣%) و١٣ عينة نعاج وبنسبة(٥.٨%).وكانت اغلب الحالات الموجبة مقترنة مع حالات الإجهاض وبنسبة (٩٢.٣%) في النعاج و نسبة(٧٥%) في الأبقار. أكدت نتائج الدراسة الحالية وجود وانتشار مرض الحمى المجهولة بين الابقار والاغنام ويمكن اعتمادها مرجعا للدراسات القادمة عن المرض سواء على مستوى محافظة ذي قار او على مستوى العراق وتوصي بإجراء دراسة موسعة تتضمن تشخيص المرض باستخدام العزل الجرثومي او تفاعل البلمرة المتسلسلة و توصي ايضا باستيراد الفحوصات المختبرية الخاصة بتشخيص مرض الحمى المجهولة في الإنسان والحيوان .