Short Communication

Seropositivity of Goats for Coxiellosis in Bareilly Region of U.P. India

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Abstract | Recent scientific perspectives on Q fever as the most contagious and one of the most widespread bacterial zoonoses, its listing amongst the top 13 priority zoonoses globally. This prompted us to undertake a seroprevalence study in goats, which are one of the most common animal reservoirs for coxiellosis. In the present investigation, 22 out of 500 (4.4%) goat serum samples collected from small animal slaughter house, Bareilly, UP, India tested positive for IgG antibodies against *Coxiella burnetii* using commercial ELISA Kit. However, a more comprehensive study including other potential reservoir animals, their products and vectors is needed for elucidating the epidemiology of the coxiellosis in the Indian settings.

Keywords | Q fever, Coxiellosis, Zoonoses, ELISA, Seroprevalence, Goats, India

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Q fever caused by highly infectious pleomorphic obligate intracellular gram-negative bacterium- *Coxiella burnetii*, is the most contagious (Grace et al., 2012) and one of the most widespread zoonoses (Eldin et al., 2017). Known since 1930s, it remains an important occupational zoonosis with a very low infectious dose, and the recent Dutch outbreak during 2007-2012 proved its devastating potential to cause severe impact, both on humans as well as on animals (Gwida et al., 2012). The ILRI, Kenya has also listed Q fever amongst the top 13 priority zoonoses on global basis, in terms of human health impact, livestock impact, amenability to agricultural interventions and severity of disease (Grace et al., 2012).

Domestic ruminants (cattle, sheep and goats) are considered as the main reservoirs for *C. burnetii*, but other pet animals *e.g.,* cats, dogs, rabbits, birds etc. have also been found to be associated with human disease (Sidi-Boumedine et al., 2010). In livestock, *C. burnetii* infection mainly leads to reproductive disorders like abortions, stillbirth, weak calf, metritis and infertility, with associated economic impact for the herd (Arricau-Bouvery and Rodolakis, 2005). The high-risk groups for Q fever includes livestock farmers, shepherds, sheep shearers, meat processing plant employees, animal by-product waste processors, abattoir workers, veterinarians and researchers handling the organism or sample (Camacho et al., 2000).

Epidemiological studies on coxiellosis in man and animals have mainly used serological tests to assess the prevalence of *C. burnetii*, using IFA, ELISA and CFT as the tests of choice in screening procedures. In case of animals, CFT is the OIE recommended test, however, it is no more used in recent times on account of its lesser sensitivity as compared to ELISA or IFA (Rousset et al., 2009). Serodiagnosis of Q fever in humans is currently done by IFA as the reference method (Angelakis and Roult, 2010). However, it is very tedious, time consuming and, requires special laboratory facility such as fluorescent microscope. Typically, the ELISA is preferred for all practical reasons, and therefore, remains at present, the recommended choice for seroprevalence studies (OIE, 2015).

In India, ever since the first confirmed case of Q fever recorded in man in 1954, reports on isolation of the agent from various sources and several serological investigations among man and domestic animals from various states have indicated the endemic nature of Q fever (Barbuddhe et al., 2007). The seroprevalence rate of coxiellosis among goats in various parts of India varies from 1.9 to 60 (mean 13.1) per cent (Stephen et al., 2014). The present study was undertaken to assess the seroprevalence of *C. burnetii* infection among goats slaughtered in Bareilly region, of Uttar Pradesh and thereby, to indirectly assess the potential risk posed to slaughter house workers and goat rearing community in the region. During the period of November, 2014 to August, 2015; a total of 500 goat blood samples were collected in sterile vials from the slaughter house located in Shahdana area, Bareilly. The samples were transported to laboratory under chilled condition, processed for sera separation and stored at -20°C until further use. The goat sera samples were screened using commercial ELISA kit (IDEXX laboratories , USA) as per the manufacturer's protocol. In brief, the ELISA plates pre-coated with inactivated phase I and phase II *C. burnetii* antigens were used for the assay. The goat serum samples along with the positive and negative controls supplied with the ELISA kit were initially diluted to 1:400 with the sample diluent provided in the kit. Positive and negative controls were included in each run in duplicate. At the end of the test, the absorbance values (optical density-OD) were measured @ 450 nm wavelength (Bio-Rad 680 microplate reader operator). Results were expressed in percentage by employing the formula: OD reading of the test sample (S/P) = 100× (S–N) / (P–N), where S, N and P are the OD of test sample, negative control, and positive control, respectively. Results were interpreted as per the manufacturer's guidelines and S/P ≥ 40 percent were considered as positive.

On sero-screening of slaughtered goats by ELISA test kit, 22 out of the 500 goat serum samples turned out positive for reactive antibodies against *C. burnetii*, with a seroprevalence of 4.4% for coxiellosis. This observation was comparable to that of an earlier report of Stephen et al. (2014) who reported a 5.64% coxiellosis seroprevalence among goats slaughtered in Tamil Nadu and Puducherry region of India. But, on the contrary Yadav and Sethi (1979) have reported a higher seroprevalence rate of 15.85%, respectively among goats in Uttar Pradesh region. However, seroprevalence of coxiellosis in Indian context appears to be lower than other parts of the world, wherein it has been reported as high as 66% in Iran (Khalili and Sakhaee, 2009), 48% in Cyprus (Psaroulaki et al., 2006), 42% in USA (McQuiston and Childs, 2002), 7% in Greece (Pape et al., 2009) and 8% in Netherlands (Van den Brom et al., 2013). However, the Poland reporting nil seropositivity for caprine coxiellosis (Czopowicz et al., 2010) was an exception. The lower seroprevalence of caprine coxiellosis observed in our study might be attributed to the difference in sample size, time frame of collection and rearing of goats in small flocks or in very small numbers at house hold level rather than under intensive farming.

ELISA being more sensitive than CFT and more rapid and convenient than IFA, is considered as very suitable epidemiologic screening tool. The seroprevalence of caprine coxiellosis observed in our study indirectly reflected at the hidden but potentially dangerous threat posed to the slaughter house workers, especially in view of the aerosol transmission, high infectivity and high stability of the pathogen that may be present in great numbers in the blood, excreta, placenta, vaginal discharges and other tissues of infected animals. Q Fever being asymptomatic in goats barring late abortions (Njeru et al., 2016) posses never ending risk to goat owners, since the infected animal can excrete the organism through varying routes as milk, urine, faeces, and mostly in birth fluids and placental membranes wherein they reach up to a billion organisms per gram (Porter et al., 2011). Hence, the animal handlers as well as slaughter house workers should be made aware of the risk and control measures to be adopted. A more comprehensive study involving other potential reservoir animals, their products and vectors is needed for elucidating the epidemiology of the coxiellosis in the Indian settings. Further, the risk assessment studies based on the shedding patterns of the pathogen in clinical samples like milk, vaginal swab, urine, faeces and birth materials should also be undertaken employing molecular techniques like PCR, combined with serological screening of the animals, for formulating effective the control strategies.

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The authors declare that they have no competing interests.

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