

## Coxiellosis: A Neglected Zoonotic Disease

**Bhoomika<sup>1\*</sup>, Anjay<sup>2</sup>, Seuli Saha Roy<sup>3</sup>, Purushottam Kaushik<sup>3</sup> and Sanjay Kumar Bharti<sup>4</sup>**

<sup>1</sup>Assistant Professor, Department of Veterinary Public Health & Epidemiology

<sup>2</sup>Associate Professor, Department of Veterinary Public Health & Epidemiology

<sup>3</sup>Professor, Department of Veterinary Public Health & Epidemiology

<sup>4</sup>Associate Professor, Department of Veterinary Anatomy

ARTICLE ID: 11

Coxiellosis (Q fever) is a bacterial zoonotic disease, which is highly infectious disease among livestock, birds and humans. Q fever was first described by Derrick in the year 1935 as an outbreak of febrile illness in abattoir workers in Brisbane, Australia. Derrick examined all the workers infected but couldn't find the diagnosis therefore the disease was named as "Q" for Query fever. Some workers also suggested that Q stood for Queensland, the state in which it was first recognized. The Q fever is distributed globally except few countries like New Zealand. Q fever exhibited the variable clinical features with the geographical distribution. The incidence of Q fever is mainly occurring in the people in rural areas who are in contact with animals. The most common mode of transmission to human is through the aerosols containing pathogens.

### **Causative agent of Q fever:**

Q fever is caused by a bacteria named *Coxiella burnetii* (*C. burnetii*). It is gram negative, obligatory intracellular bacteria. Due to variation in the cell wall of the bacteria, it is appearing in two different antigenic forms phase I and phase II. The Phase I form is highly virulence and is isolated from the infected host. The organism is highly resistant to the environment conditions. It is most heat-resistant vegetative pathogen found in raw milk and considered as reference pathogen for milk pasteurization.

### **Sources of infection:**

The reservoir of the *C. burnetii* is extensive. However, wild animals, domestic animals and ticks act as the principal reservoir of the disease. *C. burnetii* multiply in the gut of ticks and shed large number of organisms in the faeces. Contaminated hides and wool may act as a source of infection to humans either by direct contact or through the dried faeces via airborne dust particles. The most common farm animals act as a potential source for human infections

are cattle, goats and sheep. After infection *C. burnetii* localizes in the uterus and in the mammary glands of the animals. Infected animals excrete the organisms in various excretions and secretions such as in urine, faeces and in milk. At the time of parturition large number of bacteria released in the environment through the foetus and foetal membranes. Pregnant animals abort once but act as a carrier and secrets organism in two successive parturitions. Outside the animals the bacteria remain as small, dense and spore like forms which is able to sustain harsh environmental conditions. It can then contaminate dust and be spread by wind for long distance. The organism is highly infectious that single inhaled organism can cause clinical illness in an animals and humans.

### Transmission of disease:

#### Animal to animal:

- Inhiation of infected aerosol generated through dried excretion and secretions of the animals.

#### Animal to human:

- Inhiation of infected aerosol generated through dried excretion and secretions of the animals.
- Ingestion of the unpasteurized milk and its products from the infected animals.
- Direct contact with the infectious material like aborted tissue samples or faces.

#### Human to human:

- Inhiation of infected aerosol during healthcare of patients
- Blood transfusion and through sexual route

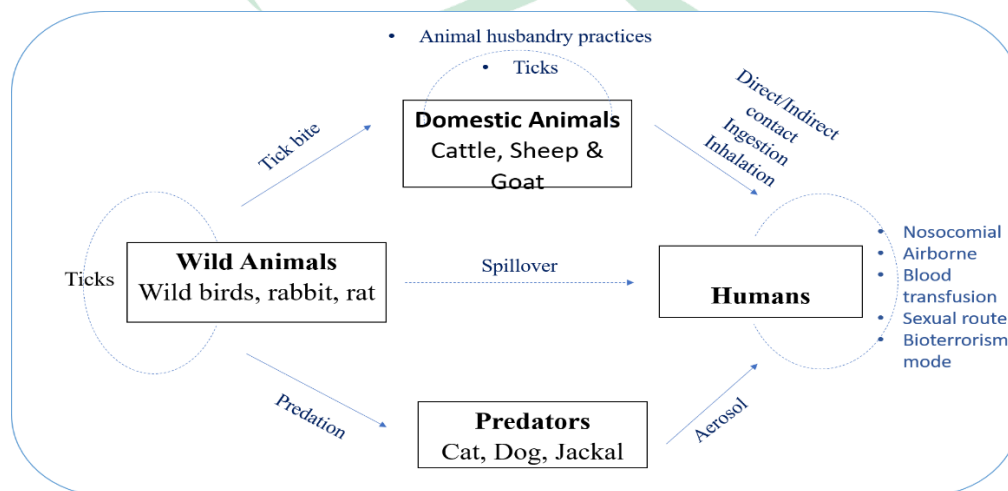


Fig. Zoonotic transmission cycle of Q fever

**Symptoms in animals:**

- The infection in animals usually remains asymptomatic in non-pregnant animals.
- Infection in pregnant animals leads to abortion, still birth in advanced pregnancy.
- In females, the infection is associated with infertility and repeat breeding.
- Persistence infection leads to the chronic endometritis with fibrosis of perivascular and peri glandular it is because the organism localizes in the uterus.
- The organism also causes the endometritis and vasculitis.

**Symptoms in human:**

Most of the human cases are remain subclinical. However, the average incubation period of the disease is 21 days. Following symptoms will be appear in infected person:

- Acute clinical manifestation leads to flu-like symptoms like fever, pneumonia, myalgia, headache, occasional abdominal pain.
- Endocarditis and hepatitis were also observed in some acute cases.
- In chronic cases, endocarditis is the main clinical finding, with vascular disorder like aneurysm, dilated cardiomyopathy, ischemic heart failure, and osteomyelitis are the common symptoms.
- Infection in pregnant women leads to the spontaneous abortion or stillbirth, without prior clinical symptoms.

**Risk group:**

As this is occupational zoonotic disease thus the people who works in the close affinity with the animals i.e. farm workers, slaughterhouse workers, workers in meat packaging plants, veterinarians and wool sorters are more prone to getting infection than other groups of people. People with compromised immune systems and those with pre-existing heart valve problems are at high risk of this complication, which is often fetal.

**Diagnosis:**

Diagnosis of Q fever is mainly done by serological (Latex agglutination test, immunofluorescence assay, ELISA, complement fixation test) and molecular method (PCR, Real time PCR). Isolation of the organism is relatively difficult in artificial media.

**Prevention and control:**

- Isolate the infected animals from the healthy livestock.
- Vaccinate the animals where the infections are common.

- Hygienic handling of the birth tissues and birth fluids, and to clean and disinfect areas where animals have given birth to prevent the further spread of disease.
- Always pasteurized the milk before consuming
- The strict controls are needed and *C. burnetii* is to be handled under biosafety level 3 standards.

**Conclusion:**

Q fever is one of the highly contagious although neglected zoonotic diseases in India. It is caused by highly pathogenic bacteria which can only be handled in (Biosafety Level 3) BSL 3 laboratories. Ticks are natural reservoir of the bacteria and plays important role in maintenance of the disease in the wild life. Cattle, sheep and goat are mainly susceptible for the *C. burnetii* infection. Human can get disease from the farm animals through inhalation of infected aerosol or by consumption of improperly cooked meat and un-pasteurized milk of infected animals or handling of infected materials without taking proper hygienic measures. The incidence of disease among the humans can be minimized by following proper hygienic measures, regular health checkup of the animals, vaccination and most importantly awareness among the population.

**References:**

- Angelakis, E., and Raoult, D. 2010. "Q Fever." *Veterinary Microbiology* 140(3-4): 297–309.
- España, P. P., Uranga, A., Cillóniz, C., and Torres, A. 2020. "Q Fever (*Coxiella burnetii*)." In *Seminars in Respiratory and Critical Care Medicine*, vol. 41, no. 4, 509–521. Thieme Medical Publishers.
- Sahu, R., Rawool, D. B., Dhaka, P., Yadav, J. P., Mishra, S. P., Kumar, M., and Barbuddhe, S. B. 2021. "Current Perspectives on the Occurrence of Q Fever: Highlighting the Need for Systematic Surveillance for a Neglected Zoonotic Disease in the Indian Subcontinent." *Environmental Microbiology Reports* 13(2): 138–158.
- World Organization for Animal Health. (<https://www.woah.org/en/disease/q-fever>)