

**COXIELLA BURNETII IN EGYPTIAN INFANTS  
AND CHILDREN WITH HEPATITIS**

**THESIS**

Submitted for partial fulfilment  
of Master Degree in Pediatrics

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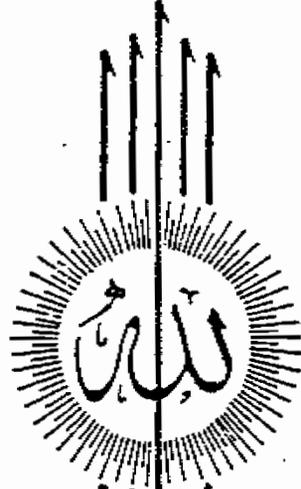
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My Gratitude and thanks to  
GOD for his kind support  
to me.

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**INTRODUCTION  
AND  
AIM OF THE WORK**

## I. Introduction :

Rickettsia are small gram-negative bacilli that are distinct from other bacteria because of their obligate intracellular parasitism. They typically range in size from 1.0-2.0  $\mu\text{m}$  but pleomorphism is common and rickettsia multiply by transverse binary fission (*Wisserman and Waddle, 1975*).

*Coxiella burnetii*, a member of the family rickettsiaceae, is the causative agent to human Q fever and the micro-organism is endemic throughout the world and is mainly transmitted subclinically through animals (*Tianabos et al., 1989*).

Q fever was first observed in Australia. *Derrick (1973)* described a disease, under the name of Q (Query) fever, which affects abattoir workers and dairy farmers in Queensland.

Q fever is an acute febrile illness that occurs world wide, the most common animal reservoirs for this zoonosis are cattle, sheep, and goats. This domestic ungulates, when infected, shed the desiccation-resistant organisms in urine, faeces, milk and especially in birth products (*Babudieri, 1988*).

### Aim of the work

The aim of this work is to estimate the prevalence of antibodies to *Coxiella burnetii* in Egyptian infants and children with hepatitis.

**REVIEW OF  
LITERATURE**

## **Coxiella Burnetii**

### **II. Bacteriology :**

#### **1. Morphology :**

*Coxiella burnetii* differs in several important aspects from other members of rickettsiaceae. It is highly pleomorphic and it may be seen as a diplobacillus, 0.25 to 1.25  $\mu\text{m}$  in size, it is gram-negative, but it is stained easily with Giemsa's and other stains. It possesses a limiting membrane, and contains both nucleic acid 'RNA and DNA (*Sawyer, 1987*).

#### **2. Growth :**

*Coxiella burnetii* can be grown in yolk sac cells of chick embryo and in cultures of mammalian cells, and it grows best in an ample supply of oxygen (*Baca, 1983*).

#### **3. Resistance :**

*Coxiella burnetii* has the ability to survive in the dried state for long period and it has survived in exposure to a temperature of 143°C : to 144°C: for 30 minute. It is highly resistant to many physical and chemical agents which destroy most rickettsiae and survive for long period in dust (*Marrie et la., 1988*).

#### **4. Antigenicity :**

Several strains of *Coxiella burnetii* have been isolated, only minor antigenic difference have been detected between them. These mainly concern variations in the sensitivity of antigens in complement-Fixation and agglutination test (*Topping et al., 1986*).

The organism exist in two phases. When first isolated from a patient it is in phase I. Shortly after, the organism is converted into Phase II. The host produces at first only antibodies to phase II, so that a freshly isolated organism will not react with serum

drawn in the early stage. After 30 days, phase I antibodies are produced and *Coxiella burnetii*, whether in phase I or phase II, will react with this late convalescent serum (*Wilson, 1982*).

In man, phase I antibodies may not be produced at all, except in chronic infection (*Ormsbee; 1983*).

### **5. Immunity :**

Cell-mediated immunity may be an important mechanism useful for inhibition and eradication of rickettsiae in tissue. Patients convalescent from various rickettsiae exhibit delayed hypersensitivity reactions to injected rickettsial antigens (*Wisseman et al., 1985*).

## **III. Epidemiology :**

### **Age and Sex Distribution :**

Q fever is usually regarded as a disease mainly of adults but it can occur in children exposed to infection (*Harman, 1979*).

The problem of childhood *Coxiella burnetii* infection was first raised in., 1973 by Derrick, he mentioned cases of Q fever in school age children in Queensland, Australia. But there was no relation between age and sex during Q fever infection (*Richardue et al., 1985*).

### **2. Source of infection and methods of spread :**

#### **\* Reservoir in nature :**

The infection is maintained in nature by ticks, and *Coxiella burnetii* has been demonstrated in the following ticks : *Rhipicephalus sanguineus* in Arizona, *Hyalomma Sauignyi* in Sapin, *Hyalomma manrituanicum* in Algeria, *Haemaphysalis excavatum* in Morocco, *Haemaphysalis punctata* from sheep in

Zimbabwe and *Haemaphysalis dromedrarii* form bulls in Egypt.

The cattle ticks, *Boophilus annulatus micropuls*, maintains the infection in cattle in Australia and transmits it to man (*Reimer, 1993*).

**\* Human infection :**

When ticks are involved in human transmission cases are few and sporadic. Farm workers are commonly affected by direct transmission when they are in contact with sheep at lambing time or with sheep which abort. There is a high incidence in those whose work takes them to farms where they are exposed to direct infection, rural postmen, agricultural machinery salesmen and those in contact with agricultural workers, such as village barbers and grocers.

When direct transmission is involved outbreaks may be explosive and involve a number of individual (*Ralph et al., 1992*).

The most likely sequence of events in the cycle of transmission of *coxiellaburnetii* to humans is that the organism is maintained in ticks or other arthropods. These ectoparasites infect domestic and other animals including a variety of small mammals. Infected domestic ungulates are usually asymptomatic, although abortion or still birth may result. The heavily infected placenta contaminates the environment at the time of parturition. Air samples are positive for up to 2 weeks after parturition, and viable organisms are present in the soil for periods of up to 150 days. Humans are infected by the inhalation of contaminated aerosols (*Thomas, 1990*).

Coxiella burnetii infection affect the human fetus, also human milk can serve as a source of infection in breast-fed babies (*Richardus et al., 1985*).

### **3. Epidemicity : (Fig. 1).**

The micro-organism is endemic throughout the world and it is mainly transmitted subclinically through animals. Sporadic cases may occur over long period and over wide areas of country (*Dupuis et al., 1985*).

Outbreaks of Q fever in man may be as explosive as water born outbreaks of typhoid fever, but in such outbreaks there is never any evidence that the patients have been bitten by ticks (*Siegert et al., 1979*).