

# Seroprevalence of *Coxiella burnetii* among humans in Nasiriya city- South of Iraq.

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## Summary

Out of 146 human(males+females) serum samples,were collected randomly from patients at Nassiriya hospitals from women suffering from abortions and unknown fever which may result from infection with Q fever, they were 46 (31.5) samples seropositive for *Coxiella burnetii*. According to sex there were 13 samples (28.2%) and 33 samples (71.8%) seropositive in male and females respectively. According to age they were 9 (19.59%) seropositive samples in the age 3-20 years, 28 (60.88%)in 21-40 years and 9 (19.59%) samples in 41-89 years 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 disease in humans in Thi-qar province (Nasiriyah city-Iraq).

## الخلاصة

خضعت ( 146 ) عينة مصل جمعت عشوائيا من الإنسان في محافظة ذي قار لفحص الاليزا الذي يكشف عن أزداد الجرثومة بطوريها I و II. بلغت نسبة الإصابة 35.13%، 30.28% في الذكور والإناث على التوالي. أظهرت النتائج وجود (46) عينة موجبة لفحص الاليزا الخاص بالجرثومة وبنسبة إصابة بلغت 31.5% في الذكور والإناث ومن جميع الأعمار. وظهرت وجود 13 عينة موجبة (28.2%) من اصل 37 عينة ذكور ووجود 33 عينة موجبة (71.8%) من اصل 109 عينة اناث . كان سبب ارتفاع نسبة الإصابة هو أن العينات البشرية جمعت من أشخاص يعانون من مشاكل صحية مختلفة مشابه لأعراض الإصابة المتوقعة للمرض وذلك يعني ارتفاع مستوى الأزداد في الدم وندرة استخدام المضاد الحيوي تتراسايكلين ومشتقاته ويعد الدواء الاكثر فعالية على الجرثومة. تشير الدراسة الحالية الى انتشار مرض الحمى المجهولة بين البشر في مدينة الناصرية في محافظة ذي قار وتؤكد بان المرض مشتركاً بين الإنسان والحيوان وتوصي بإجراء دراسة موسعة تتضمن تشخيص المرض باستخدام العزل الجرثومي او تفاعل البلمرة المتسلسلة و توصي باستيراد الفحوصات المختبرية الخاصة بتشخيص مرض الحمى المجهولة في الإنسان والحيوان هدفت الدراسة الحالية إلى الكشف عن أزداد جرثومة المسببة لمرض الحمى المجهولة، في الإنسان في محافظة ذي قار حيث يعد المرض مشتركاً بين الإنسان والحيوان ومنتشر عالمياً.

## 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. In 1935 researchers in the United States isolated a rickettsial agent from ticks that called nine Mile agent which was subsequently linked to acquired human infection.(2, 3) the agent were later determined to be identical and were eventually named *Coxiella burnetii* in honor of Harold Cox and MacFarlane Burnet. *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 *Coxiella burnetii* infection (3,5). Ticks are considered to be the natural primary reservoir of *Coxiella 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).

Q fever is a disease caused by an obligate intracellular bacterium, *Coxiella burnetii*. This disease is endemic worldwide (3,4) *C. burnetii* is a gram-negative coccobacillus that resides and replicates in host monocytes and macrophages (10) *C. burnetii* is highly infectious; only one organism is required to produce infection under experimental conditions (11). Infected animals shed highly stable bacteria in urine, feces, milk, and through placental and birth 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 endocarditis) can occur (3). Acute Q fever is a flu-like illness, which is self-limiting and probably does not play an important role in the spread of disease to humans. (10,14) Chronic Q fever is a severe disease that requires prolonged antibiotic therapy because the infection can result in endocarditis (7) or granulomatous hepatitis (8). In addition, the *Coxiella burnetii* infection can lead to abortions, stillbirth, or pre-mature deliveries in pregnant women (7). In humans, infection results mainly from inhalation of contaminated aerosols from amniotic

fluid, placenta, or contaminated wool. **Materials and methods:** A total of 146 human serum samples ( 5 but the disease may also be acquired by the digestive route <sup>(6)</sup>. At greatest risk are persons in contact with farm animals (veterinarians, farm workers, butchers) as well as laboratory personnel who work with infected animals <sup>(9)</sup>. In cattle, Q fever is mainly associated with reproductive disorders (abortion, metritis and infertility) <sup>(17)</sup>.

Routine diagnosis of Q fever is usually based on the detection of specific antibodies by Complement fixation, immunofluorescence and enzyme-linked immunosorbent assay (ELISA) tests.

**Results:** Out of 146 human serum samples, Isolation of *Coxiella burnetii* is hazardous, difficult and time-consuming and requires confined biosafety level laboratories due to the zoonotic nature of the microorganism <sup>(18)</sup>.

According to sex there were 13 samples (8.2%) and 33 samples (71.8%) seropositive in male and females respectively (Table 1). Rapid differentiation of *Coxiella 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 <sup>(12)</sup>.

Table (1) : The percentages of *C. burnetii* infection in human .

sex \ result	male		female		Total	
	NO.	%	NO.	%	No.	%
+ve	13	28,2	33	71.8	46	31.5
-ve	24	24	76	76	100	68.5
Total	37	25.34	109	74.66	146	100

According to age there were 9 (19.59%) seropositive samples in the age 3-20 years, 28 (60.88%) in 21-40 years and 9 (19.59%) samples in 41-89 years (Table 2). According to sex the results showed 35% seropositive in males and 30.27% seropositive in females respectively (Table 2).

Table(2) *C. burnetii* infection related to sex and age in both sex.

Age \ Sex	Male		female		Total	
	No.	%	NO	%	No.	%
Total samples	37	35.13	109	30.27	146	31.5
(3-20)Years	5	38.46	4	12.12	9	19.59
(21-40)=	7	53.85	21	63.63	28	60.88
(41-89)=	1	7.69	8	24.24	9	19.56
Total +	13	28.2	33	71.8%	46	100%

### Discussion:-

The present study which done in Nasiriya city , as first study , showed that *C.burnetii* infection is common in our society, out of 146 human samples there are 46 (31.5%) seropositive samples for *C.burnetii* , this ratio explained the zoonotic and world wide distribution of this microorganism where it is reported in the most area of the world especially in the European , U.k , U.S.A, south America and others.

Our results is similar to many studies in many area such as 48.8% in Ireland farmers(40) and the study which reported in eastern turkey which show that

(32.4%) of farmers infection with coxiellosis<sup>(33)</sup> and the study on Australian abattoir workers which explain that (29%) of workers infection with Q fever<sup>(34)</sup>,the study of (234) patients with vascular diseases in bulgaria (34.61%) of them were infection with Q fever<sup>(35)</sup>. Basque country (38.5%) , (30%) in Sweden farmers <sup>(32)</sup> , while different in compared with other ratios such as(13.9%) in Greece<sup>(37)</sup>, (16%) in Australian cattle workers(38),(15.78%) of Bulgarian patients with pneumonia <sup>(35)</sup>, (12.7%) (10.8%) (18.7%) in Madrid , Sevilla and lanzarote respectively<sup>(29-24)</sup>.

This increasing in the prevalence of *C. burnetii*

infections in Iraq is expected because of cumulative exposure and multiple of the reservoirs in the nature which include many species of mammals, birds and ticks also the infections of *C.burnetii* is most often latent in animals with persistent shedding of bacteria to the environment however in females intermittent high level shedding occur at the time of parturition with millions of bacteria being released per gram of placenta fluids <sup>(19)</sup>.

The other cause of prevalence of *C.burnetii*, is a limit using of tetracycline family which is the drug of choice in treatment of *C.burnetii* infection in human patients in Iraq generally.

Human are usually infected by contaminated aerosols from domestic animals particularly after contact with parturient females and their birth products <sup>(21)</sup>. Also the high risk to exposure to infection is increasing by direct contact with animals such as butchers,

veterinarians, framers <sup>(22)</sup>. Also, the consumption of contaminated foods e.g.: un pasteurized milk and diary products . These risks is common in our society because the nature of lifestyle and direct contact with animals.

Data from seroepidemiological studies conducted in other European countries have shown low prevalence of *C.butntii* infection 15 % has been found in Italy, republic of Czechoslovakia ,Switzerland and Sweden <sup>(25-26)</sup>, 19% , 23% in Germany <sup>27)</sup> and France respectively <sup>28)</sup>. These differences in the seroprevalence of *C.burnetii* in the regions which mention above may due to economy based on fishing and service sector activities <sup>(21-20.23)</sup>.

From the main reasons of differences of previous studies in prevalence of *C.burntii* because this studies based mainly on serologic tests especially (ELISA) , Complement fixation and indirect immunoflourescent

assay however the seroprevalence of *C.burnetii* infections varies widely from 1 country to another and from 1 state to another and also the reports from same state show wide differences depending on testing methods and year of surveys<sup>(29)</sup>

The results of this study shows that the percentage of infections of Q fever in men (35.13%) is more than the percentage in women (30.27%) (Table 3) and this result explains that the prevalence of *C.burnetii* infections was higher in males than woman as reported in other studies and this probably because Q fever is an occupational disease<sup>(30)</sup>.

According to the (Table 2) which include the percentage ratio of *C.burnetii* infection according to the age ( in both males and females) note that the high infection is concentrated in adult ages (21-40) as (53.85%) , (63.63%) in males and females

respectively and this ratio is corresponding with most studies which showed that the high ratios of infection with Q fever occur in the adult ages<sup>(31)</sup>. The ages (4-67) years old with the median of 43.5 old are mostly associated with Q fever infections.<sup>(38)</sup>

In conclusion , the result of this study confirms the prevalence of anti- *C.burnetii* antibodies in Nasiriya region , the data obtained from this study may be useful as reference in further studies in Thi-Qar region or in Iraq. Further studies in Iraq , beside the 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.

#### References :-

- 1-Derrick, E.H. (1937). "Q" fever, new fever entity: clinical features, diagnosis, and laboratory investigation. Med J Aust.;2:Pp281-299.
- 2-Davis, G.E.and Cox, H.R(1938).A filter-passing

- infectious agent isolated from ticks. I. Isolation from *Dermacentor andersoni*, reactins in animals, and filtration experiments. Public Health Rep;53:Pp2259-2261.
- 3- Maurin, M., Raoult, D. (1999). Q fever. Clin. Microbiol. Rev.,; 12: Pp518-553.
- 4- Norlander, L. (2000). Q fever epidemiology and pathogenesis. Microbes Infect.,; 2:Pp 417-424.
- 5- Hilbink, F., Penrose, M., Kovacova, E., Kazar, J. (1993). Q fever is absent from New Zealand. Int. J. Epidemiol.,; 22: Pp945-949.
- 6- Fishbein, D.B. and Raoult, D. (1992). A cluster of *Coxiella burnetii* infections associated with exposure to vaccinated goats and their unpasteurized dairy products. Am. J. Trop. Med. Hyg.,; 47:Pp35-40.
- 7- Raoult, D. and Marrie, T.S. (1995). Q. Fever., Clin. Infect. Dis.,; 20:Pp 489-495.
- 8- Weir, W.R.C., Bannister, B., Chambres, S., De Cock, K., Mistry, H. (1984). Chronic Q fever associated with granulomatous hepatitis. *J. Infect.*,; 8: Pp 56-60
- 9- Hatchette, T.F., Hudson, R.C., Schlech, W.F., Campbell, N.A., Hatchette, J.E., Ratnam, S., Raoult, D., Donovan, C., Marrie, T.J. (2001). Goat-associated Q fever: a new disease in Newfoundland. Emerg. Infect. Dis.,; 7: Pp 413-419.
10. Maurin, M. and Raoult, D. (1999). Q fever. Clin Microbiol Rev;12: Pp 518–553.
11. McCaul, T.F. and Williams, J.C. (1981). Developmental cycle of *Coxiella burnetii*: structure and morphogenesis of vegetative and sporogenic differentiations. J Bacteriol;147:1063–1076.
- 12- Zhang, G.Q., Hotta, A., Mizutani, M., Ho, T., Yamaguchi, T., Fukushi, H., Hirai, K. (1998). Direct identification of *Coxiella burnetii* plasmids in human sera by nested PCR. J. Clin. Microbiol.,;36: Pp 2210-2213.
13. Lennette E.H, Clark W.H, Abinanti M.M, et al. (1952). The effect of pasteurization on *Coxiella burnetii* in naturally infected milk. Am J .Hyg;55:Pp 246–253.
14. Krumbiegel, E.R. and Wisniewski, H.J. (1970). Q fever in Milwaukee. II. Consumption of infected raw milk by human volunteers. Arch Environ Health;21: Pp63–65.
15. Milazzo, A. Hall R, Storm PA, et al. (2001). Sexually transmitted Q fever. Clin Infect Dis;33:399–402.
16. Tigertt, W.D, Benenson, A.S, Gochenour, W.S. (1961). Airborne Q fever. Bacteriol Rev;25: Pp 285–293.
- 17- Hissig, M., and Lubsen, J. (1998). Relationship between abortions and seroprevalences to

- selected infectious agents in dairy cows. J. Vet. Med. B.,; 45: Pp 435-441.
- 18- Scott, G.H. and Williams, J.C. (1990). Susceptibility of *Coxiella burnetii* to chemical disinfectants. Ann N Y Acad Sci;590:Pp 291-296.
- 19- Tringali, G. and Mansueto, S.(1987). Epidemiology of Q fever in Italy and other mediterranean countries. Zbl Bakt Hyg A;267:20-25.
- 20- Sanzo JM, Garda-Calabuig MA, Audicana A, Dehesa V. Q.(1993). fever prevalence of antibodies to *Coxiella burnetii* in the Basque country, Int J Epidemiol.;22:Pp 1183-88.
- 21- maurin, M. and Raoult,D. (1999). Q.FEVER.clin microbial Rev, oct;12(4): Pp 518-53.
- 22- TraUero E, Cilia G, Montes M, Saenz-Dominguez JR, Alcorta M. (1995).Prevalence of *Coxiella burnetii* infection among slaughterhouse workers in northern Spain. Eur J Clin Microbiol Infect Dis;14: Pp71-73.
- 23- Tellez, A. and Martin, A.(1999). Study of *coxiella burnetii* human and animal seroprevalence in rural population in madrid community.Eur J Epidemiol ;5:Pp 444-46.
- 24- Pascual-Velasco F, Rodriguez-Perez JC., Otero, I., Borobio MV. (1992). Seroprevalencia de la fiebre Q en la poblad6n adulta de Lanzarote(Islas Canarias). An Med Interna;9: Pp 428-32.
- 25- Tringali, G. and Mansueto, S. (1987). Epidemiology of Q fever in Italy and other Mediterranean countries. Zbl Bakt Hyg A;267:Pp20-25.
- 26- Macellaro, A., Akesson, A., Norlander, L. (1993). A survey of Q-fever in Sweden. Eur J Epidemiol;9: Pp 213-16.
- 27- Heinrich, R., Naujoks-Heinrich, S., Saebisch, R. (1983). Seroprevalence of Q fever in an endemic area of Southern Germany. Dtsch Med Wochenschr,108:Pp 1318-24.
- 28- Raoult, D., Drancoun, M., De Micro, C. (1986).Les hepatitis de la fievre Q. A propos de 14 cas et revue de la literature. Sem Hop Pans:62: 997.
- 29- wisniewski, H. and krumbigel, E. (1970). Q Fever in the Milwaukee area. Arch Enveron Health.;21: Pp 58-62.
- 30- pascual -velasco, F., Montes, M., Marimon, JM., Gilla, C. (1998). High seroprevalence of coxiella burnetii infection in Eastren cantabria(spain). International journal epidemiology.;27:Pp 142-145.
- 31- Raot, D. and Marrie, T. (1995). Q.fever. clini infect Dis.;20: Pp 489-96.
- 32-A. Macellaro, A. Akesson<sup>2</sup> and L. Norlander(1993).A survey of Q-fever in Sweden fever in Sweden Journal European Journal of Epidemiology Issue Vol. 9, No. 2 / March.



- 33- Senay,S;Zulal,O;Ufuk,D;Biray,O .(2006). The seroprevalence of coxiellosis in farmers and cattle in Erzurum District in Turkey.Institution of veterinary control and researches.Erzurm.Turkey.Jurk.J. Vet.Anim.Sci.30: Pp 71-75
- 34- Gilroy N, Formica N, Beers M, et al. (2001). "Abattoir associated Q fever: a Q fever outbreak during a Q fever vaccination program." *Australian and New Zealand Journal of Public Health* 25(4): 362-367.
- 35- Martinov.S.(2007). Contemporary state of the problem Q fever in Bulgaria.National Research Veterinary Medical Institute,Sofia, Bulgaria.
- 36- Papadogiannakis1 E.\*, Kontos1 V., Kontoul, I. Kostomitsopoulos2, N. Siochou1, E.. Tsachev3,I Vassalou1, E. Makropoulos, V. (2007) . A SEROLOGICAL SURVEY OF BRUCELLOSIS,ECHINOCOCCOSIS,QFEVER,TOXOPLASMOSIS, LEISHMANIASISANDMEDITERRANEANSPOTTEDFEVERIN ANIMAL PRODUCTIONEMPLOYEES IN GREECE. *Trakia Journal of Sciences*, Vol. 5, No. 2, Pp 70-78,
- 37- Shapiro R, Siskind V, Schofield F, et al. (1990). "A randomized, controlled, double-blind, cross-over, clinical trial of Q fever vaccine in selected Queensland abattoirs." *Epidemiology and Infection* 104(2): Pp 267-273.
- 38-Costa,p; Brigatte,M; Greco,D.(2006). Quasting one brazillian Query: Reporting 16 cases of Q .fever from Gerias, Brazil. *Med. J.*50:Pp 333-338.
- 39- McCaughey. C, McKenna .J , McKenna. C , P. V. Coyle, H. J. O'Neill , D. E. Wyatt , B. Smyth and L. J. Murray (2008). Human Seroprevalence to *Coxiella burnetii* (Q fever) in Northern Ireland [Zoonoses and Public Health](#)**Vol. 55 Issue 4, Pp 189 – 194.**

