Epidemiology of Human Brucellosis among Populations in Iraq's Provinces in 2015

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Abstract

Background: Brucellosis (Malta fever) is one of the zoonotic diseases that endemic in all the world, this disease has a history from 1937 in Iraq when the microorganism was first isolated via an Iraqi clinician.

Objective: To demonstrate brucellosis infection among Iraqi provinces and reveal relationship between Brucellosis with seasons, residence place, gender and age of the patients. In addition to diagnosis of brucellosis from patients in Baghdad province suspects of infection by serological methods (Rose Bengal test) and culture method in diagnosis of brucellosis in human.

Patients and Methods: This cross sectional study was conducted at Iraqi hospitals in different Iraqi provinces. The blood sample (serum) was obtained from 1825 patients from different age groups after reported the patient history and diagnosed clinically to have Malta fever.

Results: During The study period in Iraqi provinces in 2015, One thousands and eight hundred twenty five patients were diagnosed clinically and serologically to have brucellosis infection. The infection is more predominant in rural females in the months of summer and among Iraqi Kurdistan people. In Baghdad regions the serologic test was positive in most cases (71.3%) while only 38.3% were positive for Brucella culture.

Conclusion: Our results indicate that patients were contact with infected livestock or suspected infection of *Brucella* like: goat, sheep, cow and buffalo located in epidemiological regions in Iraq province across the study period .

Keywords: Epidemiology, Malta fever, Brucellosis.

Introduction:

Brucellosis (Malta or undulant fever) is one of a bacterial zoonotic illness that affecting animals and man worldwide (1, 2, 3). In Iraq, brucellosis is a common disease (4, 5, 6). In Iraqi Kurdistan, the three Kurdish northern Iraqi Provinces, Erbil, Dahuk and Sulaimani, it is a widely spread disease and remains a health problem (3). Sharing borders with Iran, Syria and Turkey, wars and conflicts, deficient protective measurement, the shortage of monitoring plans, and lack of control on animals transmission during open the borders increase the prevalence of Brucella infection (3). However, the disease in the United States is less than 0.5% cases /100 000 inhabitance; 100–200 cases were reported yearly to the Centers of Disease Monitoring and Protection in US (US- Public Health Officials). Brucella species are cocco-bacilli gram-negative bacteria, they have many routes of transmission including: direct contact with animals or environment, consuming of uncooked animal product (6). Meantime, it is a vocational risk to laboratory and farms workers, patrons of cattle, and meat investigators (6,7,8) .The transmission from person to person is rare (9, 8), but they have been reported the disease transmission in association with Transfusion of blood and transplantation of bone marrow (8). The Brucella infection in human either acute or chronic disease continue for many years (10, 8).

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Moreover, Brucella species are categorized as class-B biodefense factors and potential bioterrorism factors (6,7). They are four Brucella species that recognized as a human pathogens; *Brucella melitensis, Brucella abortus, Brucella canis and Brucella suis, with* their animal reservoirs of sheep and goats, cattle, dogs and swine respectively (6,7). The disease in the animals is livestock, often obvious as abortions or reproductive troubles. Brucellosis is a pyrogenic disease without specified symptoms, but it can cause localized effects in the organ systems (11). Human Malta fever have an incubation period from five days to five months (2–3 weeks typically) (12, 2). But it mayn't show any signs of infection for several months (13, 14). Clinical symptoms vary widely from patient to patient and ranging from asymptomatic disease to severe illness but they may include recurrent fever, sweats mainly in the night, sleeplessness, arthralgia, headaches, fatigue, malaise, neuralgic symptoms and ache in joints, muscles , and-or back (12,14). Some symptoms and signs can continue for a long time but others may not re-occur, including arthritis, recurrent fever, endocarditis, swelling of liver and-or spleen, swelling of testicles, neurologic symptoms (5% of all cases), and chronic fatigue (14). The failure in the Treatment and the retrogression rates are high and depend on the treatment incorporation and the patient compliance because *Brucella* is intracellular and its capability to fit with environmental situations encounter in its replication (13). The Malta fever disease also has main economical outcome due to the patients will lose his

time and cannot do their normal daily activity (15) and loss in animal output (16). Vaccination of animals is the most effective way to eradicate this zoonosis disease especially in the prevalence regions (13, 14). Not consuming undercooked meat and unpasteurized dairy products and using protective tools when handle tissues are best ways to prevent the infection in human (14, 17).

Patients and Methods:
This project was a cross sectional survey done in the term between January to December, 2015. One thousands and eight hundred twenty five patients were admitted to the Iraqi hospitals in different Iraq provinces, and were observed clinically to be suffering from Brucella infection. Statistics were obtained from Ministry of Health -Communicable Disease Control Center. The blood sample (serum) was obtained from all the patients suspected Malta fever and diagnosed serologically by using Rose Bengal test (titer of ≥1:160). The test was done, according to the procedure described by Alton *et al.* (18). The following points from each patient were studied: place, date of infection, age, sex, and residency. In Baghdad province in addition to

serological examination (Rose Bengal test); the bacteriological examination like: Gram stain and blood culture were performed to detect and isolation of microorganism. About 5 ml of blood collected from the patients for blood culture and serological test. The media that used in culture was Trypticase soy agar (Brucella gar).Bacteriological examination (microbial and biochemical tests) were done to isolate the microorganism. The microbial Identification was performed according to Macfaddin (19).

Results:
During The study period that covered the year 2015, One thousands and eight hundred twenty five patients were diagnosed clinically and serologically to have brucellosis infection. Fig-1 shows the distribution of age groups with brucella patients was from first years old to forty- five years old. The most cases (70.4%) of brucella infection were among the age group (15-45 years), then the age group (>45 years) were (19.8%), and less common in the other patients age.
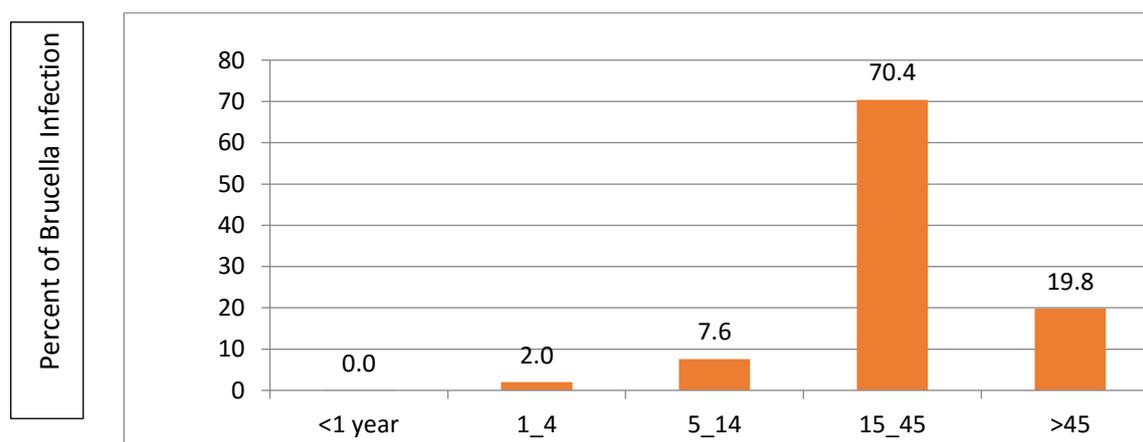

Fig-1: Distribution of the Age-groups with Brucella Patients

Table (1) demonstrate that Female were more influenced than males, the number of infected males were 699 (38.3%) and the infected females were1126 (61.7%). The ratio of male: female was (1:2).

Table-1: The Distribution of Patients with Brucellosis Among Gender.

Gender	Patient number	%
female	1126	61.7
male	699	38.3
Total	1825	100%

The seasonal variations of infection among patients with brucellosis were demonstrated in Fig-2. High number of cases were recorded in May 2015 which reported 266 (14.6%), August 246 (13.5%), September 218 (11.9%), June 214 (11.7%) and July 180 (9.9%) respectively
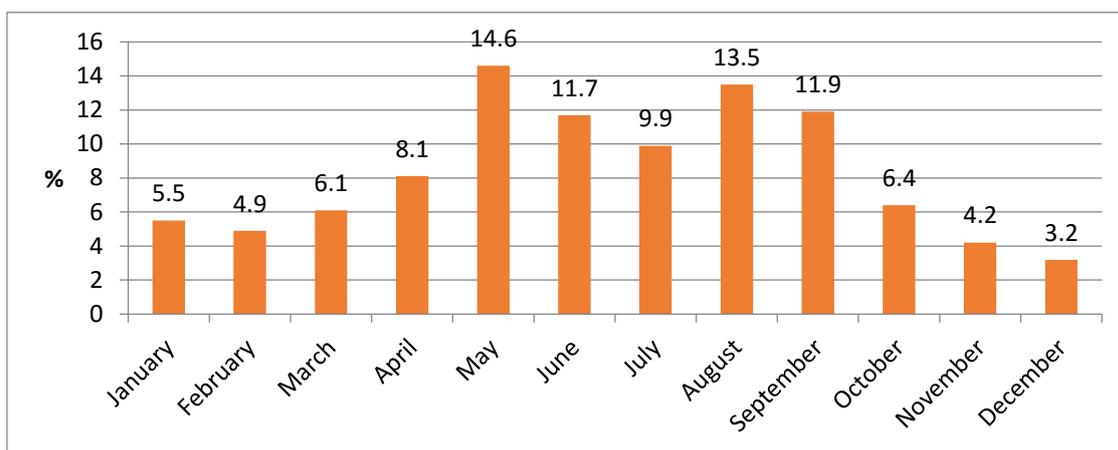
Fig-2: The Distribution of Number of Cases According to Month's Variation

Fig-3 demonstrated the number of patients with brucellosis in eighteen Iraq's provinces in year (2015). The most cases of brucellosis recorded were from Al-Sulaymaniyah which represent796 case (43.6%), followed by Erbil and Nineveh 240, 174 case (13.2% and 9.5%) respectively. While the cases from Anbar was 0% because of the war situation at this year so no data obtained.
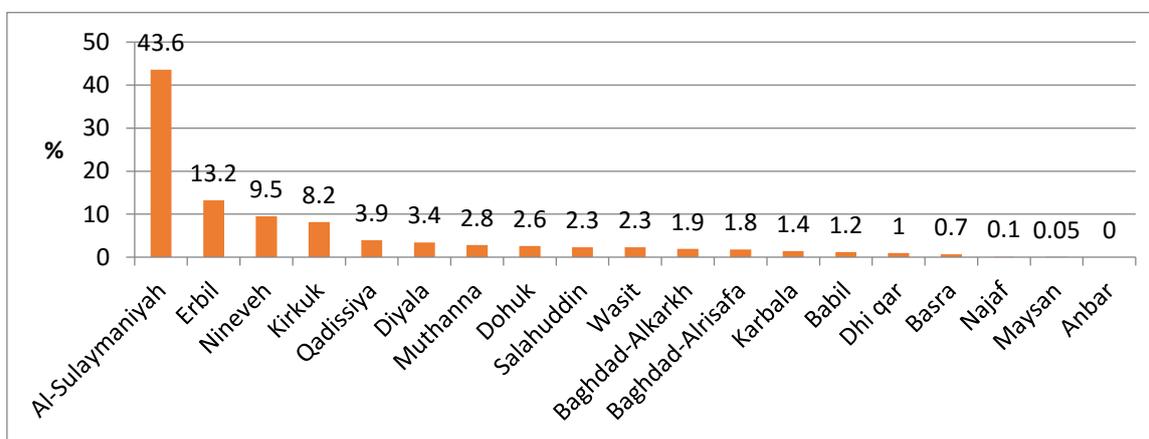

Fig-3: Brucellosis among Patients in Different Iraq's Provinces in 2015

The incidence of Brucella infection through persons from rural individual were 1046 (57.3%) and from urban individual were 779 (42.7%), as demonstrated in table-2.

Table-2: The Relationship of Cases with the Residence of Patients.

Residence	No.	%
Rural	1046	57.3
Urban	779	42.7
total	1825	100

Table -3 shows that in Baghdad province 94 patients were diagnosed clinically and serologically to have Brucellosis, only 38.3% of patients were positive for brucella culture while 71.3% were positive for Rose Bengal test. There was no significant relation between culture positive results in the positive Rose Bengal cases with Baghdad districts (P>0.05).

Table -3: Relationship Between the Different Region in Baghdad According to Serological test (Positive) and Brucella Blood Culture (Positive)

Baghdad hospitals	No of patients suspected to brucellosis	No. of patients with Positive Rose Bengal test	No. of patients with positive Blood culture test
Baghdad-Alrisafa	46	33 (71.7%)	15 (32.6%)
Baghdad-Alkarkh	48	34 (70.8%)	21 (43.8%)
total	94	67 (71.3%)	36 (38.3%)

$X^2 = 0.55$, P value = 0.585 NS

Discussion:

Brucellosis is a common zoonotic disease of worldwide distribution. It continues to be a serious public health issue in Iraq, especially in epidemiological region in Iraq because population who consumes unpasteurized dairy products like: milk, cheese and also population who contact with infected animals. High, endemic level ever since. Awareness about the disease among physicians, however, is low, and in a substantial fraction of patients, diagnosis of brucellosis is only made after the causative organism is unexpectedly detected in cultures of blood or exudates specimens or serological test like: Rose Bengal test (20).

Although high percentage of false negative results is reported, the most common serologic test used in our country is Rose Bengal test (RBT). There is an association of direct and indirect laboratorial tests with clinical and epidemiological data is essential to perform a definitive diagnosis of brucellosis (21). In this study we found that brucellosis was greater in age-group of patients (15-45) followed in (>45 years old). These results due to increased risk of exposure mainly the occupational exposure as farmers, shepherd and house wives. This can be interpret that farmers are contact directly with infected animals and also consume milk and milk products that are locally made (22, 23). The incidences of brucellosis among females were more common than males, although brucellosis affects both sexes (1, 8). This result was compatible to other studies (23, 1, 8) and incompatible with other reports (5, 24). This result demonstrated that most females were house wives who contact directly with milk, meat or caring the animals (4, 1, 8). Brucella infection was more common during the months of summer. This may be due to the exposure to the disease was high because the deliveries of animals occur in the spring so increased in milk production following it and contamination of milk is more marked (24, 1). Our results are similar to other results of study in AL-Musaib (1) and Babylon (25). In our study the most cases of brucellosis were from north provinces especially **Iraqi Kurdistan** i.e. Al-Sulaymaniyah followed by Erbil. Many reports indicate that major endemic areas include countries of the Mediterranean basin, Middle East, including Iraq and Iraqi Kurdistan, parts of Mexico and Central and South America and the Indian subcontinent,. New foci that have emerged include the Balkan Peninsula and many of the former Soviet Union Asian Republics, such as Kazakhstan, Tajikistan and Kyrgyzstan (6, 3). Although the improvement made in monitoring and control, the diffusion of Brucella infection is rising in most developing countries due to socio-economic, various sanitary, and political agents (3). Incidence of brucella infection varies not only between countries but also within countries. This suggests that demographic, occupational, and socioeconomic factors play a significant role (26). The incidence of human brucellosis in Iraqi Kurdistan are still high and it has been reported from all three Iraqi Kurdistan provinces. In 2012 in Erbil the prevalence rate was reported (10.7%), (27) and in Dohuk was (6.36%) in 2011 (28). while in 2013, 976 cases were recorded in Al-Sulaymaniyah which is highest incidence of brucellosis in Kurdistan and Iraq (29). These records are higher than records from neighboring countries. In Turkey the prevalence of brucellosis varies between 2% and 6% (30). However, these numbers are underestimated as diagnosis is occasionally confused due to non-specific clinical manifestations, wide use of the Rose Bengal Test, which is imprecise, shortage in the appropriate laboratory facilities in remote and rural region, and poor collaboration and interchange of information between veterinarian and public health

departments (31, 3). Women are more likely than men involved in household and agricultural activities in Kurdistan and because they are more in contact with domestic livestock (32, 27). Many Researches in the region and Kurdistan have shown that prevalence of Brucella infection is greater in rural areas and among women (32, 27). Other research indicated that the incidence of brucella infection through persons from rural individual were (59.6%) (1, 33). These results were similar to our result that the happening of Brucella infection among rural persons were (57.3%). These result because the most of rural persons were indirect contact with domestic animals (24, 1, 27).

 Only 36 samples from 94 patients (38.3%) were positive for bacterial culture in Baghdad province that were diagnosed clinically to have Brucella infection, while 71.3% were positive for Rose Bengal test , these results because of brucella are intracellular and the difficult in cultivation of this bacteria, and also most patients were taken antibiotic therapy before bacterial culture (1, 8). So the Rose Bengal test appears to have its main value in epidemiological surveys to detect the risk of infection in different population groups (34, 20). Sometimes the Rose Bengal test show false-positive results with typhoid fever and *Yersinia enterocolitica* because of cross-reactions with antigens from other organisms; so the diagnosis is incorrect in some cases, and that suspected typhoid fever not Malta fever. In Al-Sulaymaniyah Statistical analysis showed that (59.82%) patients revealed positive result by RBT and it is increase comprised with culture (50.42%) (20).

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