# Seroprevalence of human brucellosis in Erbil city

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Dlsoz Kareem Rasul* Isam Yousif Mansoor *

## Abstract

**Background and objectives:** Brucellosis is an acute or chronic illness manifested principally by chills and fever. Occasionally, chronic relapsing febrile episodes occur. Brucellosis is endemic in animal and humans are infected incidentally. The aim of the study was to examine the incidence of brucellosis in Erbil City, study the relation between the rate of infection and a number of predisposing factors.

**Methods:** Blood samples were collected from (2085) patients suspected of having brucellosis attending, Erbil Teaching Hospitals and Rizgary. The sera were examined using Rose Bengal test.

**Results:** Serum samples from patients showed (10.7%) of positive reaction indicating the presence of anti-brucella antibodies. Seropositivity of brucellosis in female (12.48%) was significantly higher than male (8.02%), and in rural area was (40.98%) and in urban area was (9.44%). The highest seropositivity of brucellosis occurred among age group (21-30) years. The infection rate with *B. miletensis* and *Brucella abortus* was (71.75%) and (28.25%) respectively. The highest seropositivity occurred among individuals who were in contact with animals (37.34%), and in occupations was the highest among the farmers and dairy workers (37.5% and 37.28%) respectively. In Monthly distribution showed the highest sero-positivity occurred in October (12.72%).

**Conclusion:** Sero-posivity of brucellosis in Erbil City is somehow similar to the neighboring countries. There are variations in the incidence of brucellosis in relation to sex, age, area, occupation, source of infection and seasons.

**Keywords: :** Brucellosis, epidemiology, Rose Bengal test.

## Introduction

Brucellosis is an infectious bacterial disease caused by members of the genus *Brucella*. It is a disease of world wide importance.[1] Several synonyms of brucellosis have been known like Malta fever, undulant fever, Rock of Gibraltar fever and Bang's disease. Though its distribution is worldwide; yet brucellosis is more common in countries with poorly standardized animal and public health program.[2] Brucellosis has been well known in European and Mediterranean countries particularly after the disease was isolated in 1887 by Sir David Bruce.[3] The genus Brucella can infect a wide range of mammals ranging from rodents to killer whales. They are of particular zoonotic and economic importance as a cause of highly transmissible disease in cattle, sheep, goats and pigs. Human infection arises through direct contact with infected animals, including handling of infected carcasses; indirectly from a contaminated environment; or through consumption of infected dairy product or meat.[4] Brucellosis is a zoonotic infection with important effects on both public health and animal health and production and is wide spread in many areas of the world, particularly in some Mediterranean and Middle East countries. *Brucella melitensis*,

*Department of Microbiology , College of Medicine, Hawler Medical University, Erbil, Iraq.

the main etiologic agent of Brucellosis in small ruminants, was the first species described in the genus Brucella[5], later on three more species were isolated which cause human and animal infection (*Brucella abortus*, *Brucella suis* and *Brucella canis*).

## Methods

### Sample collection

This study was carried out during the period October 2009-April 2010. Blood samples were collected from 2085 patients attending, Erbil and Rizgary Teaching Hospitals with signs and symptoms of brucellosis. Patients collected from both sexes, variable age groups, occupation, and from urban and rural communities. Information obtained from patients were recorded on data sheet. Five ml of venous blood were collected from each of (2085) patients and kept in sterile test tube. The blood samples were immediately brought to the laboratory at Erbil Teaching Hospitals and Rizgary. Serum samples obtained and processed using the following serological tests.

### Rose-Bengal test

Patient serum was tested with three different Rose Bengal reagents to detect the presence of anti-brucella antibodies. Reagent (A) contains a suspension of mixed antigens of *Brucella abortus* and *Brucella melitensis*. Reagent (B) contains a suspension of specific antigen of *Brucella abortus*. Reagent (C) contains a suspension of specific antigen of *Brucella melitensis*.

### Statistical Analysis

All data entry and analysis were performed using SpSS 11.05for Windows (SPSS Inc. USA) The chi- square test also used the statistical significant of difference in proportion by system determined by Mcnemar $X^2$ analysis. A p value < 0.05 was considered significant

## Results

As can be seen in Table (1), anti-brucella antibodies were detected in (223) patients sera using Rose Bengal test. The seropositivity of brucellosis among patients in Erbil governorate was (10.7%). The rate of seropositivity among female and male was (12.48%, 8.02%) respectively. The ratio of female: male was 1.55:1. The results also showed that the rate of seropositivity among patients from urban areas (84.8%) was higher than that of rural area (15.2 %). The ratio of rural: urban- rate of positivity-was 4.34:1. When the positive number divided on total number the seropositivity in rural area was (40.98%) and in urban area was (9.44%).The result in the present study showed Table (2), Figure (1) that the highest percentage of sero-positivity occurred among age group (21-30) year and the lowest among the age group (61-70) year The results in the present study showed Table (3) that the highest percent of infection was caused by *Brucella melitensis* (71.75%) and the lowest with *Brucella abortus* (28.25The incidence of brucellosis in relation to source of infection was examined. The results showed Table (4) that the percentage of infection among dairy consumers (86.1%) was significantly higher than those in contact with animals (13.9%).When the positive number divided on total number the seropositivity of brucellosis (37.34%) in those in contact with animals %). The incidence of brucellosis was the highest among farmer and dairy worker (37.5%, 37.28%) and the lowest among teacher (4.15%), Table (5).The results presented in Figure (2) showed that the highest percent of infection occurred in October (12.72%) and the lowest in February (8.72%) and started to increase in March.

**Table 1:** Seropositivity of human brucellosis in relation to gender and areas

| Test | Positivity No % | Items | | Positivity No % | Negative No % | Total % |
|---|---|---|---|---|---|---|
| Rose Bengal | 223 (10.7) | Gender [1] | Female | 156 (70) | 1094 (59) | 1250 (60) |
| | | | Male | 67 (30) | 768 (41) | 835 (40) |
| | | Total | | 223 (100) | 1862(100) | 2085(100) |
| | | Area [2] | Urban | 189 (84.8) | 1813 (97.4) | 2002 (96) |
| | | | Rural | 34 (15.2) | 49 (2.6) | 83 (4) |
| | | Total | | 223 (100) | 1862 (100) | 2085(100) |

**Table 2:** Seropositivity of human brucellosis in age group

| Age group(year) | Total No | Positive No | Rate of Positivity (%) |
|---|---|---|---|
| 11-20 | 305 | 40 | (13.11) |
| 21-30 | 224 | 70 | (31.25) |
| 31-40 | 320 | 54 | (16.87) |
| 41-50 | 366 | 39 | (10.65) |
| 51-60 | 460 | 12 | (2.6) |
| 61-70 | 410 | 8 | (1.95) |
| Total | 2085 | 223 | |

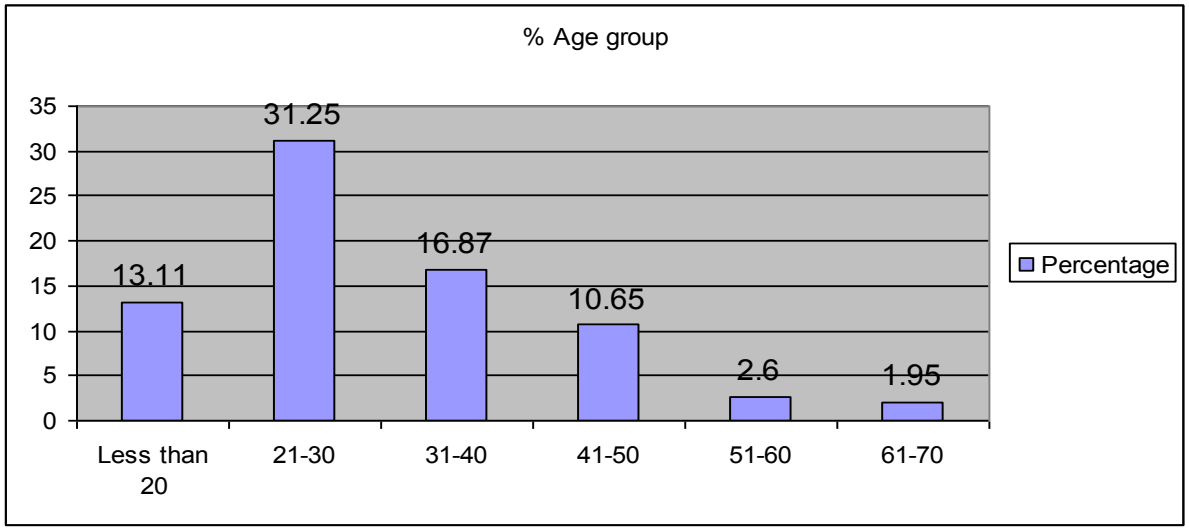


**Figure 1:** Percentage of seropositivity according to age groups

**Table 3:** Incidence of brucellosis in relation to the type of *Brucella* species

| Species | Positivity | |
|---|---|---|
| | No | (%) |
| *Brucella melitensis* | 160 | (71.75) |
| *Brucella abortus* | 63 | (28.25) |
| Total | 223 | (100) |

**Table 4:** Incidence of human brucellosis in relation to the source of infection

| Source of infection | Positivity | Negative | Total |
|---|---|---|---|
| | No (%) | No (%) | No (%) |
| Dairy consumer | 192(86.1) | 1810 (97.2) | 2002 (96) |
| Animal contact | 31(13.9) | 52 (2.8) | 83 (4) |
| Total | 223(100) | 1862 (100) | 2085 (100) |

Chi- square Test= 46. 29 / P-value =0.000 / ** (P<0.05)

**Table 5:** distribution of human brucellosis according to occupations

| Occupation | Total | Number and % of patient | |
|---|---|---|---|
| | No | No | (%) |
| Officer | 540 | 50 | (9.25) |
| Teacher | 265 | 11 | (4.15) |
| Student | 305 | 38 | (12.45) |
| Housekeeper | 545 | 68 | (12.47) |
| Shopkeeper | 285 | 18 | (6.3) |
| Hospital worker | 62 | 7 | (11.29) |
| Farmer | 24 | 9 | (37.5) |
| Dairy worker | 59 | 22 | (37.28) |
| Total | 2085 | 223 | |

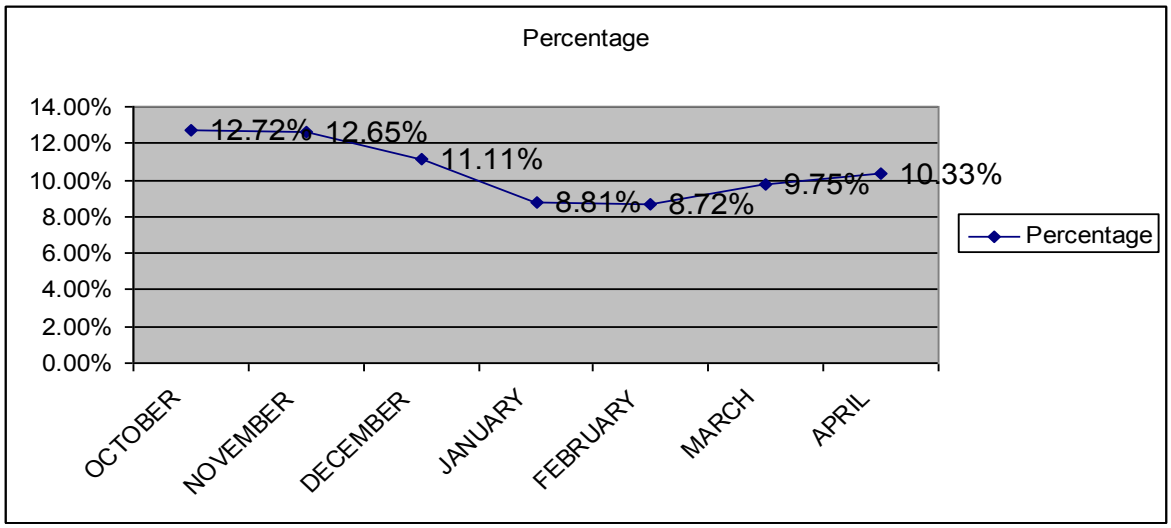


**Figure 2:** Monthly distribution of confirmed cases of Brucellosis

## Discussion

The results in the present study showed that the seropositivity of human brucellosis in patients was (10.7%). The prevalence rate in this area seems to be lower than that of the neighboring countries. In Jordan, Abu Shaqra [7] reported the prevalence rate of (16.7%) This due to that people in this region is more dairy consumer and more in contact with animals. The result showed that percent of female having brucellosis was significantly higher than male. This result is in agreement with those reported by Shareef and coworkers. [8] However this result does not agrees with those reported by Ali and others. [9] The high prevalence rate among female in this area may be attributed to the fact that females are more involved in working in house by contact with infected meat or milk during preposition as housekeeper in urban area, also of their major role in managing animals and dealing with their products or their work as farmer in rural areas.In the present study, the result showed that seropositivity of brucellosis among populations of urban areas was less than those of the rural areas. These results agree with those reported by Mubarak [10] who showed that the incidence of brucellosis among populations of rural area was significantly higher than among the population of urban area this due to that the population in rural area more in contact with infected animal. The highest percentage of brucellosis recorded was in the age group (21-30) years and the lowest in age group (61-70) years. This result is in agreement with those reported by Nerweyi. [11] This may be due to that people in this age group are more dairy consumer and more in contact with animals. In this study, the types of Brucella were identified to the species level using anti- Brucella melitensis and anti-brucella abortus antisera. The result showed that the incidence of infection with *Brucella melitensis* was higher than that of *Brucella abortus*. This result agrees with Salman and Kadir in Iraq.[12] However, these results do not agree with the results of other studies Kambal and coleaguse in Saudi Arabia [13] found that the incidence of infection with *Brucella abortus* was higher than *Brucella melitensis* among individuals they have studied. These differences might be due to that the people of this area are in contact with sheep and goat or their product. The results in the present study showed that the seropositivity of infection among dairy consumers was lowest than that of animal contact individuals. The results in the present study were agreed with those reported by Malik in Saudi Arabia [14], who found that the human brucellosis was high among individuals who were in contact with animals. These are due to that people in contact with animals are more reliable to infection. The result in the present study showed that the seropositivity of brucellosis was the highest among farmers and dairy workers (37.5% and 37.28%) respectively, and the lowest among teachers (4.15%). Human brucellosis in area of Erbil is mainly an occupational disease and health problem for whole population. This result is in agreement with those reported by Mubarak [10], and Nerweyi [11], and not agrees with those observed by Ohomel and colleagues. [15] They found that dairy consumer more infected.The results in the present study showed that the highest percentage of brucellosis was recorded in October (12.72%) and the lowest in February (8.72%). The results also showed that the seropositivity started to increase in March and April. These results suggest that incidence of brucellosis declines during winter and start to increase during spring and Summer Seasons. These results agree with those reported by Qasim Iraq.[16] The high incidence of brucellosis in spring and summer is attributed to that spring is the parturition season for animals which cause abortion and this due to more transmition of disease between animals and that in summer the dairy products start to increase in the market.

## Conclusion

1- Rate of sero-posivity of brucellosis in Erbil City is somehow similar to the neighboring countries.
2-Females in this area are more prone to Brucella infection than male.
3-There are variations in the incidence of brucellosis in relation to age, areas, occupation, source of infection and seasons
4-The incidence of infection with *Brucella melitensis* significantly higher than with that of *Brucella abortus*

## References

1. Hirsh, D.C. and Zee,Y.C. Veterinary Microbiology. Blackwell Science:1999; 196- 202
2. Capasso, L. Bacteria in two - millennia - old cheese, and related epizoo Noses in Roman populations. J. Infect, 2002; 45: 122–127.
3. Jawetz, E .Melnick, J. L.and Adelberg, E. A. Review of medical micro biology. 22th ed. (Appleton and Lange) Medical Publication, 1998.
4. Greenwood, D.; Slack, R.C. B.; and Peutherer, J. F. Medical microbiology. 17th ed. Churchill Living stone: 2007; 336- 338.
5. Alton,G .G . Brucella melitensis. In: Animal brucellosis. (Nielsen, k; Duncan, J. R; eds) CRCpres. Boston: 1990; 383 – 409.
6. Alton, G. G.; Jones, L. M.; Angus, R. D.; and Verger, J. M. Techniques For the brucellosis Laboratory. Institule National Delarecherche Agronomique. 147, Ruedel Universite, 75007 Paris, 1988.
7. Abu Shakra, Q. M. Epidemiological aspect of brucellosis in Jordan. Eur J Epidemol, 2000; 16:581- 4.
8. Shareef, J. M.; Abdi, A. A.; Maroof, A.; and Saeed, A. M. The preva -lence of Brucella agglutininse in Karadakh district among humans, goats, and sheep. J. Zanko Sulaimani, 1999;2 (1):50-57.
9. Ali, M. M.; Lal, B. and Reddy, R. Brucellosis in a rural community. Saudi med. J, 1998; 19(3):298-300.
10. Mubarak, K. M. Brucellosis patient's and evaluating of some biological Variable in the patient's blood. Doctorate Thesis, Science College Al-Mustansiriyah University, Mosul, Iraq, 1999.
11. Nerweyi , F. F. Serological diagnosis of Brucellosis in Dohuk province based on locally produced card test and modified tube test prepared from *Brucella melitensis* strain rev 1- MSc. Thesis, Medical College, Dohuk University, Dohuk, Iraq, 2000.
12. Salman, Y. G.; and Kadir, M. A. Brucellosis in man and animals. First International conference on brucellosis. Mosul, Iraq, 1990
13. Kambal, A. M.; Mahgoub, E. S.; Jamjoom, G. A. and Chowdhry, M. N. H. Brucellosis in Riyadh, Saudi Arabia. A microbiological And clinical study. Trans. R. Soc. Trop. Med. Hyg: 1983; 77: 820-824
14. Malik, G. M. A Clinical Study of Brucellosis on Aduits in the Asir Region of Southern Saudi Arabia Am. J. Trop. Med. Hyg: 1997; 56(4): 375-7
15. Ohomel, B. B.; Defess, F. F.; Magiamles, D. M.; Reilly, K. F.; Farver, T. R.; Sun , R. K. and Barret, I. R. Chanchin Trends in the Epidemiology of Human brucellosis in California from 1973-1992. Ashiftwar Foodborn Trnsmission. J. Infect Dis, 1994; 170 (5):1216-23
16. Qasim, N. A. and Al- Rawi, J. R. Epidemiological Study of Brucellosis In Diala governorate. J. Communit Medicine, 1995; 8(1): 29-36