

# Prevalence of *Bartonellosis* in Stray Cats and Dogs in Mosul City, Mosul, Iraq

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## Abstract

**Aim:** The objective of this study was to investigate the prevalence, clinical signs and hematological changes resulting from natural infestation with *Bartonella Spp.* in stray cats and dogs.

**Material and method:** A total of 50 animals, including 32 cats and 18 dogs, one month to two years old of both sexes were investigated.

**Results:** The prevalence of *Bartonellosis* in stray cats and dogs (asymptomatically and clinically infected animals) were 31.25% and 66.66% respectively. Hematological diagnosis revealed significant increase in total leukocyte counts (TWBCs) and Mean Corpuscular Volume (MCV) which reflecting macrocytic hypochromic anemia; on the other hand, there was significant decrease in total erythrocytes counts (TRBCs), Hemoglobin concentration (Hb) and Mean Corpuscular Hemoglobin Concentration (MCHC) in the infected animals.

**Conclusion:** Prevalence of *Bartonellosis* in dogs is a higher than cats, Younger animals were more frequently infected than older animals.

**Keywords:** *Bartonellosis* • Stray • Dog and cats

## Introduction

*Bartonellosis* is vector-borne zoonotic disease caused by *Bartonella* spp. (Opportunistic, Gram negative, intraerythrocytic bacteria) which can infect dogs, cats and other mammals, including human [1]. Thirty-eight species of *Bartonella* were recognized in Human and animals (domestic and wild) around the world, several of them are pathogenic which can cause severe illness (fever, deep eye inflammation, enlargement of lymph nodes, muscle pain, endocarditis, transient anemia) such as *Bartonella henselae*, *B. Koehlerae*, *B. clarridgeiae* in cats and *B. vinsonii*, subsp. *Berkhoffii*, *B. Clarridgeiae*, *B. quintana* and *B. washoensis* in dog. Some cat and dogs are remaining asymptomatic carrier for long periods. The higher seroprevalence rates of *Bartonellosis* in dogs and cats were reported in European and Mediterranean countries where temperature and humidity are favorable for flea and tick infestations. In Iraq, the first report on the prevalence (15% for *B. henselae*, and 12.6% for *B. clarridgeiae*) of *Bartonella* spp. among stray cats was reported, who collected blood samples from 207 stray cats as part of the US Army Zoonotic Disease Surveillance Program [2-8].

Up to our information there is no previous study about the infection with *Bartonella* spp. in stray cats and dogs in Mosul City, Therefore, we suggest performing this study for determining prevalence, clinical signs and hematological changes resulting from natural infestation with *Bartonella* spp. in stray cats and dogs.

## Materials and Methods

In this study (32) cats, (18) dogs (male and female) aged between one month to two years old were selected randomly from different areas of Mosul city during the period between May 2009-May 2011. All animals were examined clinically and signs recorded before blood samples were taken from the cephalic vein [9]. After collection of blood samples, some of them were cultured directly on blood agar and chocolate agar before clotting and incubated at 37°C for two days to 2 weeks, while other remaining, 2.5 ml of blood mixed with EDTA to determine complete blood picture which included: Total erythrocytes count (TRBCs), Packed Cell Volume (PCV), Hemoglobin concentration (Hb), Total and Differential Leucocytes Count (TLC and DLC), Mean Corpuscular Volume (MCV), Mean Corpuscular

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**Received:** 02 December, 2021; **Accepted:** 10 December, 2021; **Published:** 22 December, 2021.

Hemoglobin Concentration (MCHC) and platelets count using (coulter counter, Beckman, USA).

Blood smear were prepared and stained with Giemza stain to identify *Bartonella* spp. within erythrocytes as well as to study the morphological changes which is occur in RBC. The entire blood smear examined for blood protozoa and appears negative for that.

## Results

The results of blood smears examination revealed detection of *Bartonella* spp. in cat and dog with percentage 31.25%, 66.66% respectively (Table 1).

Species	Number examined Animals	of Number Affected	of %
Cats	32	10	31.25
Dogs	18	12	66.66

**Table 1.** The percentage of infection with *Bartonella* Spp. in cats and dogs.

The clinical signs of *Bartonellosis* in dogs and cats were extremely variable arranged from asymptomatic to clinical infection, which included: Intermittent fever, weakness, rough hair coat, sunken eyes and lameness. According to age younger animals were more frequently infected than older (Table 2 and 3).

Species	Number of affected	Asymptomatically	%	Clinical signs	%
Cats	10	6	60	4	40
Dogs	12	8	66.66	4	33.33

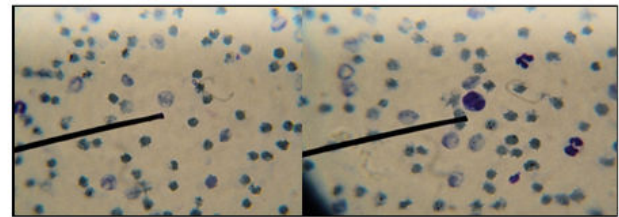
**Table 2.** The prevalence of clinical sign in animals.

Species	Age	Number affected	of %
Cats	1-5 month	6	60
	5 month-1 years	3	30
	1 year-2 years	1	10
Dogs	1- 5 month	6	50
	5 month- 1 year	2	16.66
	1 years- 2 years	4	33.33

**Table 3.** Age and percentage of the infected animals.

*Bartonella* spp. appeared in blood smear as small intracellular organisms, cocci or small rod, single or pairs. Sometimes appears as groups in the central of erythrocytes (intraerythrocytic) or curved shape (Figure 1).

**Figure 1.** *Bartonella* Spp. × 100.



The results showed there is no any growth in the blood agar or chocolate agar although the culture remained in the incubator at least 2 weeks. Respect to hematogram results showed a significant decrease  $p \leq 0.01$  in TRBCs, Hb, PCV, MCHC and a significant increase in MCV reflecting macrocytic hypochromic type of anemia. Results also indicated a significant increase  $p \leq 0.01$  in total leukocytes count, which were due to increase in neutrophils (Table 4).

Cats	Control stray cats	Infected stray cats	Dogs	Control stray dogs	Infected stray dogs
Parameter s	Mean ± SE	Mean ± SE	Parameter s	Mean ± SE	Mean ± SE
PCV%	36.55 ± 2.12	± -	PCV%	38.22 ± 1.2	-
Hgb g/dl	12.5 ± 1.20	-	Hgb g/dl	14.12 ± 2.2	-
TRBCs ×106 ml	9.15 ± 1.22	-	TRBCs × 106 ml	7.55 ± 1.12	-
platelets ×103 ml	564.5 ± 10.36	± -	platelets ×103 ml	864.5 ± 10.2	± -
MCV (fl)	40.55 ± 2.51	± -	MCV(fl)	65.33 ± 1.21	± -
McHc g/dl	33.23 ± 1.25	± -	McHc g/dl	32.47 ± 2.51	± -
TWBCs ×103 ml	14.67 ± 1.22	± -	TWBCs ×103 ml	13.32 ± 1.22	± -
Neutrophils × 103 ml	7.5 ± 0.5	-	Neutrophils × 103 ml	10.4 ± 1.5	-
Lymphocytes 103 ml	1.5 ± 0.5	1.5 ± 0.5	Lymphocytes 103 ml	2.8 ± 0.5	2.8 ± 0.5
Monocytes ×103 ml	0.12 ± 0.5	0.12 ± 0.5	Monocytes × 103 ml	0.15 ± 0.2	0.13 ± 0.2
Eosinophil × 103 ml	0.5 ± 0.03	0.5 ± 0.05	Eosinophil × 103 ml	0.5 ± 0.03	0.5 ± 0.03
Basophiles × 103	0.01 ± 0.0	0.1 ± 0.0	Basophiles ×103	0.01 ± 0.0	0.01 ± 0.0

×× ( $p \leq 0.01$ ) Values are mean ± standard error of mean

**Table 4.** Blood parameters of infected Cats and Dogs and Control Group.

## Discussion

There are little information and studies about stray dogs and cats which lives around us and contaminate the surrounding environment [10]. These animals may be infected with many different bacterial diseases such as *Bartonellosis*.

The prevalence of *Bartonella* spp. was 66.66% in dogs and 31.25% in cats, this result indicates that stray cats and dogs considered as an important risk factor for *Bartonellosis* [11-18]. In this study, the prevalence of *Bartonella* spp. in cat is higher than the value (15% for *B. henselae* and 12.6% for *B. clarridgeiae*) recorded in Baghdad, while lower than the prevalence reported in the Europe and Southeast Asia, which may reach more than 60%. In Europe, *Bartonella* spp. prevalence in dogs ranges from 3% in UK to 16.8% in Spain [19]. The differences between the result of this study and others belong to the environmental, climatic, technique variation and period of experiments.

In this study, All cats and dogs (microscopically positive for *Bartonella* spp.) suffered from asymptotically and clinically infection and this result agreed with the researcher, the diversity of clinical sign of disease belonged to duration of infection, varying degrees of host immunocompetence, difference in bacterial virulence, presence of co-infections or other debilitating disease.

The prevalence of infection seems to be in young to middle age and these results assemble to that he provided *Bartonella* was higher in the age group  $\leq 2$  years [20-22]. In stained blood smear *Bartonella* spp. appear as cocci, small rod or as groups in the central of red blood cells, which conforms to other studies, while in culturing the bacteria was not isolated from any sample tested because the organism is slow growing and tend to circulate intermittently in the blood.

## Conclusion

The results of this study indicate elevation in total leukocyte count and decrease in total erythrocytes count, *Bartonella* induce inflammatory reactions in many tissue of infected animals body lead to increase number of leukocytes also Bacteria secretes a substance called deformin that cause red blood cells to be misshapen.

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**How to cite this article:** Farwachi Maab AL, Robaiee Israa AAI and Jamaly Modruka MAI. "Prevalence of *Bartonellosis* in Stray Cats and Dogs in Mosul City, Mosul, Iraq ." *J Anim Health Behav* 5 (2021) : 141.