



ISSN: 2456-2912

VET 2024; 9(1): 634-637

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Received: 04-11-2023

Accepted: 14-12-2023

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## Ehrlichiosis in dogs: An occurrence study

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### Abstract

The present study was aimed to know the occurrence of ehrlichiosis in dog population in and outskirt of Jabalpur, (M.P.) A total of 4875 dogs (2925 male and 1950 female) were screened, presented at Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, N.D.V.S.U., Jabalpur, Madhya Pradesh, from July, 2021 to December, 2021. Among dog population 207 dogs (110 male and 97 female) exhibited clinical signs suspected to ehrlichiosis. The overall occurrence of ehrlichiosis in dogs was found to be 0.55% (27/4875). However, among dogs suspected for ehrlichiosis, it was 13.04% (27/207). Sex wise occurrence of ehrlichiosis was recorded higher in male (59.25%) as compare to female (40.74%). Intermittent fever was the most prevalent clinical sign observed in dogs (85.15%), followed by bleeding tendency/ epistaxis (66.66%), pale mucous membrane (62.96%), laboured breathing (48.14%) and arthritis/swelling of legs (37.03%). Maximum occurrence was recorded in 1-3 years of dogs i.e. 48.14%. Amongst different breeds suspected, German shepherd had the highest occurrence (37.03%), followed by Labrador retriever (22.22%).

**Keywords:** Dog, Ehrlichiosis, Occurrence

### Introduction

Ehrlichiosis is a globally distributed rickettsial disease of dogs caused by *Ehrlichia* spp. It is an obligate intracellular, pleomorphic or Coccal, gram- negative bacterium that is transmitted by tick vectors. There are two forms of Ehrlichiosis that occur in dogs: Monocytic form and Granulocytic form. The monocytic form is caused by *Ehrlichia canis* and its tick vector is *Rhipicephalus sanguineus* (Fuente *et al.*, 2008) [6]. Canine Monocytic Ehrlichiosis (CME) has three clinical forms: acute, sub-clinical and chronic. The acute form is characterized by thrombocytopenia, non-regenerative anaemia and haemorrhagic tendencies. This form is manifested clinically by high fever, depression, lethargy and anorexia. The sub-clinical form is characterized by persistent bacteremia with no overt clinical signs and normal haematological parameters. The chronic form is characterized by pancytopenia due to suppression or destruction of bone marrow and lymphadenomegaly. The acute phase of canine monocytic ehrlichiosis is more severe than canine granulocytic ehrlichiosis (Anderson *et al.*, 1992) [3]. Clinically the dogs are lethargic, weak and anorexic (Waner and Harrus, 2013) [23]. The granulocytic form (CGE) is caused by *Ehrlichia ewingii* and its tick vector is *Amblyomma americanum* (Fuente *et al.*, 2008) [6] and *Dermacentor variabilis*. The tick *Rhipicephalus sanguineus* is often associated with dogs in tropical and sub-tropical urban areas. This explains the greater prevalence of Ehrlichiosis in urban settings such as Mumbai (27.2%) and Delhi (39.5%), which have a tropical and sub-tropical climate respectively as compared to the rural Sikkim (0%) and Ladakh (0%) which have a temperate and dry-arid climate respectively (Abd Rani *et al.*, 2011) [1]. Diagnosis of Ehrlichiosis can be done on the basis of blood smear examination, cell culture, serology and molecular detection by PCR. In serology, the Indirect Fluorescent Antibody Test (IFAT) is recommended to confirm a diagnosis of ehrlichiosis. Dot-ELISA kits for the detection of *E. canis*-IgG antibodies are commercially available. Western immunoblot is a more specific test, which can distinguish between infections with the different organisms causing ehrlichiosis, anaplasmosis, or neorickettsiosis as well as between *Ehrlichia* spp., for example *E. canis* and *E. ewingii* (Straube, 2010) [20]. Keeping in view of the above facts, the present study is proposed with objective; to study the occurrence of ehrlichiosis in dogs brought to veterinary clinical complex, Jabalpur and its outskirts.

## Materials and Methods

The proposed work was conducted in the Department of Veterinary Medicine, College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur, Madhya Pradesh. The study was conducted for a period of 6 months i.e. from July, 2021 to December, 2021. For this study, a total of 4875 dogs which were brought to Veterinary Clinical Complex, College of Veterinary Science & A.H., Jabalpur (M.P.) were screened for ehrlichiosis for a period of six months i.e. from July, 2021 to December, 2021. The dogs were screened for the presence of clinical symptoms *viz.* bleeding tendencies/epistaxis (plate 01), intermittent fever, Arthritis (swelling of legs) and labored breathing, lethargy for at least 1 to 2 weeks or longer periods. A total of 207 dogs were suspected for ehrlichiosis on the basis of clinical signs. Out of which 27 dogs were diagnosed positive for ehrlichiosis on blood smear examination. For therapeutic study, 18 dogs having ehrlichiosis and six apparently healthy dogs were selected.

## Parameters of the study

### History

Complete history of the dogs regarding age, breed, sex, mucous membrane and various symptoms like bleeding tendencies (epistaxis), intermittent fever, arthritis (swelling of legs) and labored breathing was recorded.

### Clinical examination

All the dogs were thoroughly examined and different clinical parameters were recorded in each dog.

**Body temperature (°F):** The rectal temperature of dogs were recorded using clinical thermometer.

**Pulse rate (beats per minute):** Pulse rate was recorded by digital palpation of the femoral artery up to 1 minute.

**Respiration rate (breaths per minute):** Respiration rate in each dog was recorded by observing the movement of the chest for up to 1 minute. Stethoscope was also put over the thorax to auscultate the inspiratory and expiratory efforts in dogs.

### Collection of samples

For epidemiological study blood samples were collected from marginal ear vein and smears were prepared on day 0, on clean grease free glass slides and stained with Giemsa stain as per standard procedure (Kelly, 1979) [12].

### Blood smear examination

#### Giemsa's staining

Thin blood smear were prepared and fixed with methanol for 30 seconds, allowed to dry and stained in a 1 in 20 diluting of Giemsa's stain for 30-40 minutes. Subsequently, it was washed with distilled water and allowed to dry. The stained slide was examined under compound microscope in oil immersion high power objective.

## Results and Discussion

### Overall occurrence of ehrlichiosis in dogs

An epidemiological study was conducted on dogs to know the occurrence of ehrlichiosis in dog. A total of 4875 dogs were presented to VCC and 207 dogs were suspected of ehrlichiosis based on the clinical signs exhibited. 27 dogs were diagnosed on the basis of blood smear examination.

The overall occurrence of ehrlichiosis in dog population was 0.55 (27/4875) percent (Table 01).

**Table 1:** Overall occurrence of ehrlichiosis in dogs

Particular	Screened	Affected	Occurrence (%)
Dogs	4875	27	0.55

Out of 207 dogs suspected, 27 dogs were found to be affected with ehrlichiosis among the suspected dogs, the occurrence was 13.04 (27/207) percent (Table 02).

**Table 2:** Occurrence of ehrlichiosis in suspected dogs

Particular	Suspected	Affected	Occurrence (%)
Dogs	207	27	13.04

Canine Ehrlichiosis was shown to be present in 0.55 percent of dogs in total population and 13.04 percent in suspected dogs. Thirunavukkarasu *et al.* (1993) [21] and Juyal *et al.* (1994) [10] both reported lower prevalence rates of 1.12% and 0.35 percent, respectively. However, Jafari *et al.* (1997) [9], Mallapur (2002) [15], Samaradni *et al.* (2003) [16], Solano *et al.* (2006) [19], Chipde *et al.* (2007) [4], Kumar *et al.* (2010) [13] and Karthika *et al.* (2014) [11] indicated a prevalence rate of 16.7 to 55.00%. However, using PCR and blood smear examination, Lakshmanan *et al.* (2006) [14] showed 50% and 19.38% prevalence, respectively, and Tresamol *et al.* (1994) [22] reported 68.6% serological prevalence in Chennai.

The low prevalence of ehrlichiosis in dogs might be due to low density of population prevailing in and around Jabalpur.

### Age wise occurrence of ehrlichiosis in dogs

To know the age wise occurrence of ehrlichiosis, dogs of varying ages were classified into three categories. Age wise occurrence was highest in age group 1-3 years i.e. 48.14% (13/27) followed by age group >3 years i.e. 33.33% (09/27) and the minimum occurrence was recorded in <1 years of age group i.e. 18.51% (05/27). The results are shown in table 03.

**Table 3:** Age wise occurrence of ehrlichiosis in dogs

Age groups (years.)	Suspected	Affected	Occurrence (%)
<1	51	05	18.51
1-3	62	13	48.14
>3	94	09	33.33
$\chi^2 = 4.90$ $p$ -value = 0.09 non-significant at $p < 0.05$			

The incidence rate ranges from 25 to 36% (Harrus *et al.*, 1996) [8]. The prevalence of canine ehrlichiosis was highest in animals older than 2 years (66.67%) compared to animals younger than 2 years (33.33%). Abiramy *et al.* (2007) [2] and Dhankar *et al.* (2011) also found higher prevalence of ehrlichiosis in dogs older than 2 years, while Lakshmanan *et al.* (2006) [14] and Karthika *et al.* (2014) [11] found that dogs between 1-3 years were more susceptible to canine ehrlichiosis.

Higher prevalence recorded in dogs more than 2 years could be due to more risk of tick infestation in those dogs probably due to their exposure to outdoor environment.

### Breed wise occurrence of ehrlichiosis in dogs

The occurrence of ehrlichiosis was studied in various breeds of dogs at VCC, Jabalpur. The highest occurrence was recorded in German Shepherd i.e. 37.03 percent (10/27) followed by Labrador Retriever i.e. 22.22 percent (6/27),

Golden Retriever 14.81 percent (4/27), Rottweiler 3.70 percent (1/27). The Results are summarized in table 04.

**Table 4:** Breed wise occurrence of ehrlichiosis in dogs

Breed	Suspected	Affected	Occurrence (%)
German Shepherd	38	10	37.03
Labrador Retriever	34	6	22.22
Golden Retriever	22	4	14.81
Rottweiler	8	1	3.70
Others (French Mastiff, Lhasa Apso, Belgian Malinois etc.)	39	2	7.40
Pomeranian	30	2	7.40
Non descript	36	2	7.40
$\chi^2 = 12.06$ $p$ -value = 0.06 significant at $p < 0.05$			

Canine ehrlichiosis was found significantly more in German Shepherds (37.03%) breed followed by Labrador Retrievers (22.22%) as compared to other breeds affected in this study. The variance in the occurrence of ehrlichiosis in different dog breeds could be due to differences in the population size of different breeds in and around Jabalpur area.

According to (Dhankar *et al.*, 2011), Pugs (50%) and Belgian Shepherds (50%) were the most commonly infected with canine ehrlichiosis, followed by German Shepherds (37.5%), Labrador Retrievers (30%), Rottweilers (27%), Spitz/Pomeranian (33.33%), Mongrels (33.33%), and Dachshunds (33.33%). However Lakshmanan *et al.* (2006)<sup>[14]</sup> documented larger number of German shepherd affected with ehrlichiosis and maximum ehrlichia infection was reported in Labrador breed.

Pure-bred dogs had a higher prevalence of the disease than non-descript canines, according to the breed-specific prevalence survey. This finding is consistent with that of Snape (1970), who found that pure-bred dogs have a higher prevalence.

#### Gender wise occurrence of ehrlichiosis in dogs

Out of total suspected dogs (110 males and 97 females) 16 male dogs 59.25% (16/27) and 11 female dogs 40.74% (11/27) were found affected with ehrlichiosis. The results are outlined in table 05.

**Table 5:** Gender wise occurrence of ehrlichiosis in dogs

Gender	Suspected	Affected	Occurrence (%)
Male	110	16	59.25
Female	97	11	40.74
$\chi^2 = 0.46$ $p$ -value = 0.49 non-significant at $p < 0.05$			

Male dogs (59.25%) were found to be more commonly affected than female dogs (40.74%) in the current study. This could be owing to a higher proportion of males being brought to the clinics than females.

Males had a greater incidence rate, according to Harrus *et al.* (1997)<sup>[7]</sup>. In contrast, while Harrus *et al.* (1996)<sup>[8]</sup>, found no sex preference for infection.

#### Conclusion

The overall occurrence of ehrlichiosis in dog population was very low. The low prevalence of ehrlichiosis in dogs might be due to low density of population prevailing in and around Jabalpur. Higher prevalence recorded in dogs between 1 to 3 years could be due to more risk of tick infestation in those dogs probably due to their exposure to outdoor environment. The highest occurrence was recorded in German Shepherd

breed and male dogs were found to be more commonly affected in the current study. The current study's findings support the necessity for control measures against this deadly vector-borne disease.

#### Acknowledgement

I would like to express my sincere gratitude to ICAR (Indian Council of Agricultural Research), New Delhi, India, for their financial support of my current research work, as well as to my guide for their invaluable support and guidance throughout my research journey.

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