Ehrlichiosis in dogs: An occurrence study

Krishan Kumar Yadav, Devendra Kumar Gupta, Pratibha Sharma and Manju Sahu

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

<table>
<thead>
<tr>
<th>Particular</th>
<th>Screened</th>
<th>Affected</th>
<th>Occurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs</td>
<td>4875</td>
<td>27</td>
<td>0.55</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Particular</th>
<th>Suspected</th>
<th>Affected</th>
<th>Occurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs</td>
<td>207</td>
<td>27</td>
<td>13.04</td>
</tr>
</tbody>
</table>

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) [19], 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

<table>
<thead>
<tr>
<th>Age groups (years.)</th>
<th>Suspected</th>
<th>Affected</th>
<th>Occurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>51</td>
<td>05</td>
<td>18.51</td>
</tr>
<tr>
<td>1-3</td>
<td>62</td>
<td>13</td>
<td>48.14</td>
</tr>
<tr>
<td>&gt;3</td>
<td>94</td>
<td>09</td>
<td>33.33</td>
</tr>
</tbody>
</table>

χ²= 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) [3] 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),

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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) [14] 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**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Suspected</th>
<th>Affected</th>
<th>Occurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>110</td>
<td>16</td>
<td>59.25</td>
</tr>
<tr>
<td>Female</td>
<td>97</td>
<td>11</td>
<td>40.74</td>
</tr>
</tbody>
</table>

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) [7]. In contrast, while Harrus et al. (1996) [8], 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.

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**References**