Pathological, Haemato- biochemical and Immunological Studies of Cutaneous Ectoparasitoses in Dogs

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Introduction
Dog is the first carnivore to be domesticated and have been utilized for hunting, patrolling in police services, in wars and as companion. The development of dog is as obscure as evolution of man himself and its presence in social status as a pet has been increasing continuously as companion in most of the countries. The pet has got the inherent psychological instinct for companionship like human urge and the emotional bondage of a woman to its pet is often more closer than a mother to her child. Being the largest body organ, skin protects the animal from external injuries and gives a charming look to the animal. It can also be said that the skin is the mirror of dog’s body to some extent. Of the various clinical problems in dogs, dermatological complaints are recurrent and complicated.

Cutaneous ectoparasitoses is one of the important skin disease of dogs and in some instances, they cause a nuisance but mostly the cause debilitation or even prove to be life threatening. Mange is a very common ectoparasitic infestation found in dogs. Generally, two types of mange are encountered viz. Sarcoptic mange or canine scabies caused by Sarcoptes scabei var. canis and demodectic mange or canine demodicosis caused by Demodex canis. Canine scabies is an extremely pruritic and contagious disease of dogs. This condition in dog is of great public health importance as 50 per cent of human cases may result due to handling of the infected dogs. Canine demodicosis also known as demodectic mange or red mange or follicular mange usually found in young dogs, especially the short haired breeds. Natural infestation is apparently acquired neonatally through contact with the nursing bitch when the adult and motile mites invade the hair follicles of dog.

Materials and Method
In this study a total of 172 skin samples were collected from the dogs of either sex, different age groups and breeds in 10 percent formal saline and processed mechanically for paraffin embedding by acetone and benzene technique (Lillic, 1965). The sections of 4- 6 micron were cut and stained with haematoxylin and eosin method of staining for histopathological examination. The blood samples were also collected from suspected cases for analysis of various haematological parameters such as haemoglobin, total erythrocyte count (TEC), total leucocyte count (TLC), differential leucocyte count (DLC), packed cell volume (PCV) and biochemical parameters such as blood glucose, total serum protein, serum albumin and immunological parameters such as A:G ratio and serum immune globulins using their standard methods.

Results and Discussion
Pathological studies
Sarcopticosis
This condition was recorded in 10 cases. Grossly, often pruritic, reddish, papulocrustous eruptions typically had thick, yellowish crusts along with predominant alopecia. Distribution of lesions were usually on the thin haired areas of dogs. In some lesions appeared as base patches thickened, folded and rough skin. These observations are in line with those described by Misra and Basistan (1972) and Belinsky (1973).

Microscopically, presence of focal areas of epidermal edema, exocytosis, degeneration and necrosis were noticed (Fig. 1). At places, focal parakeratotic hyperkeratosis was pronounced. Varying degrees of superficial perivascular infiltration of lymphocytes were observed (Fig. 2). At other places, superficial dermatitis of hyperplastic and spongiotic type was seen. These finding were also reported by Bindseil (1974), Jayaram (1983) and Nockler et al. (1990).

Demodicosis
Demodicosis was recorded in 12 cases. Grossly, two forms of demodicosis i.e. localized or squamous and generalized were identified. In the localized form, few small, circumscribed, erythematous, hyper pigmented, scaly, non pruritic, periocular alopecia facially or on the fore legs was obtained. In generalized form large multifocal areas of alopecia, erythema and hyperpigmentation appeared on the head, legs and trunk were recorded. Almost similar observations were also discussed by Nedunchelliyan (1989).

Microscopically, follicles contained mites, keratinous debris and inflammatory perifolliculitis, folliculitis and furunculosis (Fig. 3). There were infiltration of plasma cells, lymphocytes, macrophages, mast cells and eosinophils found around the follicles (fig. 4) infiltrating the epithelium. These findings are in conformity with the earlier similar observations recorded by Schwartzman and Karl (1967) and Chesney (1999) for canine demodicosis.
Haemato- biochemical Studies

Sarcopticosis
The mean ± SE values for hematological parameters viz. haemoglobin, TEC, TLC, DLC, PCV as well as biochemical parameters such as blood glucose, total serum protein, serum albumin and serum globulin showed a decrease in TEC, haemoglobin and PCV and an increase in TLC and eosinophilic count. Similar observations were also reported earlier by Ramakrishnan et al. (1972) and Kamboj (1991).

Demodicosis
Haematological observations revealed slight decrease in TEC, haemoglobin and PCV and an increase in TLC and eosinophilia. The biochemical studies revealed hypoalbuminaemia and hyperglobulinemia. In line with present findings, Hagiwara and Germano (1974) also recorded hyperglobulinemia in dogs suffering from local and generalized demodicosis. Kulkarni et al. (1980) while studying haematology of dogs suffering from Scabies noticed leukocytosis and eosinophilia as found in present study.

Immunological studies
No remarkable changes were recorded in total serum albumin level, globulin level as well as A : G ratio and serum immune globulins in various conditions of the present investigation. These findings are not in line with Sakakibara (1976) who observed an increase in total serum protein and beta globulins accompanied with a decrease in an A : G ratio in case of canine demodicosis.

Acknowledgements
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References
Table 1 Haematological parameters of different cutaneous conditions of dogs

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Hb (g%)</th>
<th>TEC Mill/mm</th>
<th>TLC Th/ cmm</th>
<th>N (%)</th>
<th>E (%)</th>
<th>B (%)</th>
<th>L (%)</th>
<th>M (%)</th>
<th>PCV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarcopticosis</td>
<td>11.02</td>
<td>±0.55</td>
<td>17.1 ±0.62</td>
<td>67.5</td>
<td>6.75</td>
<td>0.25</td>
<td>12.75</td>
<td>4.00</td>
<td>36.25</td>
</tr>
<tr>
<td>Demodicosis</td>
<td>10.51</td>
<td>±0.47</td>
<td>17.36 ±0.68</td>
<td>69.00</td>
<td>9.00</td>
<td>0.37</td>
<td>14.12</td>
<td>4.00</td>
<td>36.50</td>
</tr>
</tbody>
</table>

Table 2 Biochemical parameter of different cutaneous conditions of dogs

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Blood glucose</th>
<th>Total protein</th>
<th>Serum albumin</th>
<th>Serum globulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarcopticosis</td>
<td>86.32 ±6.04</td>
<td>6.54 ±0.27</td>
<td>3.56 ±0.24</td>
<td>2.87 ±0.14</td>
</tr>
<tr>
<td>Demodicosis</td>
<td>88.14 ±2.90</td>
<td>6.23 ±0.11</td>
<td>2.65 ±0.17</td>
<td>3.57 ±0.21</td>
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</table>

Table 3 Immunological parameters of different cutaneous conditions of dogs

<table>
<thead>
<tr>
<th>Conditions</th>
<th>A:G Ratio</th>
<th>Serum immune globulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarcopticosis</td>
<td>1.20 ±0.08</td>
<td>2.80 ±0.05</td>
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<tr>
<td>Demodicosis</td>
<td>0.78 ±0.10</td>
<td>2.70 ±0.05</td>
</tr>
</tbody>
</table>

Fig. 1. Microphotograph of skin having sarcopticosis showing focal areas of epidermal oedema, exocytosis, degeneration and necrosis of follicle containing excessive keratinization alongwith remnants of mites. H&E 200X.

Fig. 2. Microphotograph of skin having sarcopticosis showing varying degrees of superficial perivascular infiltration of lymphocytes. H&E 400X.
Fig. 3. Microphotograph of skin having demodicosis showing follicle containing mites and keratinous debris. H&E 100X.

Fig. 4. Microphotograph of skin having demodicosis showing folliculitis in which plasma cells, lymphocytes, macrophages and eosinophils were found around the follicle. H&E 100X.