



Dermatopathological Investigation on Cutaneous Lesions in Canines

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ABSTRACT

Dermatological problem is one of the major problems encountered in small animals. Fifty one cases of dogs showing dermatological lesions were presented to Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal. The dermatological cases were recorded for three months (September to November 2021) to study the etiological agents, sex, age and breeds' susceptibility to dermatopathological lesions in canines. The age-wise incidence showed highest occurrence in dogs aged upto 1 year (31.37%). The occurrence of skin lesions were more in males (78.4%) as compared to females (21.56%). The incidence of skin infections (bacterial, parasitic and fungal infections) were highest in the non descript breeds (45%). Among exotic breeds, the incidence was more in Labrador breed (25.49%).

HIGHLIGHTS

- Highest incidences of cutaneous lesions in younger dogs of <1 year of age.
- Confirmation of bacterial, parasitic and fungal etiological agents from the skin lesions.

Keywords: Dermatological problems, dogs, incidence, Namakkal

Dermatological problem is one of the major problems encountered in small animals. Several studies have indicated that skin affections make up a significant proportion of the small animal caseload. The purpose of this study is to evaluate different skin lesions in dogs and to find out the etiological agents, sex, age and breeds' susceptibility to dermatitis.

There are many factors which may cause dermatitis including bacteria, fungi, yeast, and other predisposing factors like age, season, imbalanced nutrition, etc. Diagnostic approach for skin diseases depends on obtaining detailed history and information like the age, breed, sex with thorough physical and dermatological examination by taking skin scrapping, swab, lesion imprint examination and isolation of bacterial and fungal

pathogens using media from clinical specimens. It aids in quick and early diagnosis which helps in designing suitable therapeutic protocol with appropriate drugs.

MATERIALS AND METHODS

The dogs suspected for various cutaneous lesions were presented to Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal. Totally 51 dermatological cases of dogs were recorded from September to November 2021. The data regarding age,

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breed, sex, management system, vaccination, deworming details and duration of illness were recorded.

Detailed clinical examination of cutaneous lesions was carried out and the affected areas/region were recorded. Various methodologies were employed to collect the samples viz. skin scraping for fungal and parasitic infection and impression smears and swabs for bacterial infection. The etiologies for various dermatological lesions were ruled out by using specific diagnostic methods.

Bacterial infection

Impression smear from the cutaneous lesions were taken and stained with Giemsa stain. Sterile swabs from abscesses, pustules and exudates were inoculated into Brain heart infusion (BHI) broth and incubated overnight at 37°C. The broth was streaked into Mannitol salt agar (MSA), Eosin methylene blue (EMB) agar and kept for overnight incubation. Then the smears from the culture were examined for presence of bacterial growth. The biochemical test were employed to characterize the bacterial colonies.

Mite infestation

Skin scrapings were heated in 10% KOH solution to dissolve debris, centrifuged at 2000 rpm for 5-7 min. The supernatant was discarded and then examined under microscope. The parasites were confirmed based on the morphological characters.

Fungal infection

Skin scrapings were inoculated into Saboraud's dextrose agar (SDA), incubated at 37°C for 3-4 days and observed for growth. Sample from the culture were taken and stained with lactophenol cotton blue for identification of the fungal organisms.

RESULTS AND DISCUSSION

Fifty one cases of dogs showing cutaneous lesions were investigated. The age-wise incidence showed that the young dogs had more dermatological problem than adults (Table 1). Highest incidence was found in dogs of age less than 1 year (31.37%) followed by 1- 3 years of age (25.49%). The young dogs were mostly affected than

the adults. This might be due to increased stimulation of sebaceous glands during puberty (Kim *et al.*, 2018; Rahman *et al.*, 2021).

Table 1: Age wise incidence of dermatopathological conditions

Sl. No.	Age (years)	No. of cases	Incidence rate (%)
1	<1	16	31.37
2	1-3	13	25.49
3	3-5	4	7.84
4	5-7	9	17.65
5	7-9	5	9.8
6	>9	4	7.84
Total		51	100

The occurrence of skin lesions were more in males (78.4%) as compared to females (21.56%). The increased susceptibility of the male dogs might be due to the hormonal (increased plasma testosterone level) and behavioural influences (Rahman *et al.*, 2021). The incidences of dermatological disorders were found most commonly in non descript breeds (45%) followed by Labrador (25.49%) (Table 2). The breed predilection is influenced by composition of dog population in area and popularity of individual breeds (Pocta and Svoboda, 2007).

The animal revealed different dermatological lesions in various regions/part of the body at varying degrees. The clinical signs were alopecia, erythema, severe itching, musty odour, eczema and pustules. Skin scrapings, swabs, impression smears from skin lesions were collected to investigate various etiologies for the cutaneous lesions. Bacteria, parasite and fungus played major role in cutaneous lesions in dogs. In addition, non specific dermatological lesions also could be detected in 16 dogs (Table 2).

Bacterial infections

There was moist eczema, alopecia, abscess, purulent exudates, erythematous lesions in the affected dogs. The impression cytology smear from the lesions revealed numerous neutrophils and bacteria. The swabs from the abscess and pustules inoculated into Mannitol Salt Agar media revealed the presence of yellow colonies indicating *Staphylococcus* spp. colonies in 9 samples. Gram stain revealed presence of gram positive cocci resembling

Table 2: Various etiologies for dermatopathological conditions

Sl. No.	Breed	Etiology				Total	Incidence rate (%)
		Bacterial	Parasite	Fungal	Non specific		
1	Non descript (ND)	6	5	6	6	23	45.1
2	Labrador	5	2	3	3	13	25.49
3	German Shepherd	—	2	1	1	4	7.84
4	Pug	—	1	—	1	2	3.92
5	Spitz	1	2	—	1	4	7.84
6	Chippiparai	—	—	—	1	1	1.96
7	Rottweiler	—	—	—	1	1	1.96
8	French bulldog	—	—	—	1	1	1.96
9	Dashchund	—	—	1	—	1	1.96
10	Mudol hound	—	—	—	1	1	1.96
Total		12	12	11	16	51	100



Fig. 1: Severe alopecia all over body, severe dermatitis, skin ulceration, moist eczema. **Inset:** Gram stained smear from colonies revealing gram positive cocci of *S. aureus* resembling bunch of grapes. Gram's stain $\times 1000$

bunch of grapes indicating *Staphylococcus aureus* (Fig. 1). Furthermore tube coagulase test for the sample was found to be positive for coagulase test (Markey *et al.*, 2013).

Three samples showed green metallic sheen colonies in EMB (Eosin Methylene Blue) agar indicating *E. coli*. The smear from the colonies showed gram negative rods/bacilli in Gram's staining (Fig. 2). It was further confirmed by the IMViC biochemical test where it was positive for indole and methyl red and negative for Voges Proskauer test and citrate utilization test (Deb *et al.*, 2020).

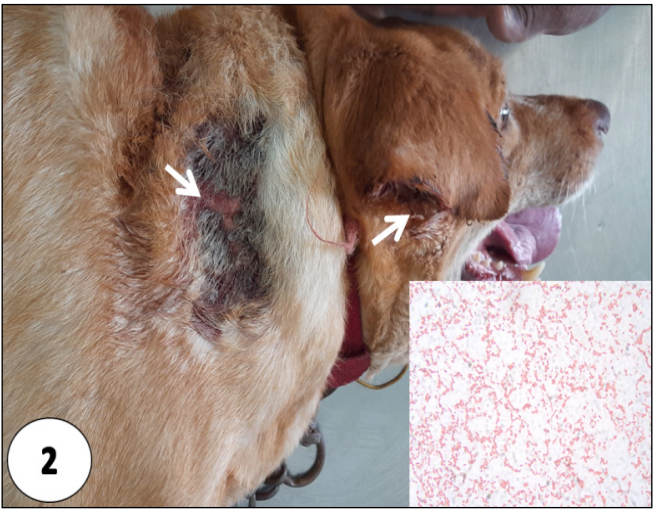


Fig. 2: Labrador with otitis externa showing purulent exudates (arrows) in the ear and skin. **Inset:** Gram stained smear from colonies revealing gram negative rods/bacilli of *E. coli* organisms. Gram's stain $\times 1000$

Parasitic infestation

There was alopecia, pruritis, crusty and erythematous lesions in the affected dogs. While the lesions were distributed or generalized in cases of demodecosis (Fig. 3), they were mostly confined to ear margins and thigh regions in *Sarcoptes* mites infestation (Fig. 4). Skin scrapings treated with 10% KOH revealed the presence of the *Demodex* and *Sarcoptes* organisms in the samples. The presence of *demodex* was characterized by cigar-shaped mites with four pairs of stubby legs in thorax



Fig. 3: Severe alopecia of the entire face, erythema, pruritis. **Inset:** Presence of *Demodex canis* mite $\times 400$



Fig. 4: Alopecia and crusty lesions on the ear margins, alopecia of abdominal and thigh region. **Inset:** Presence of *Sarcoptes scabiei* mite $\times 400$

of the body (Sharma *et al.*, 2019) while *Sarcoptes* was characterized by oval ventrally flattened, dorsally convex convex tortoise like body with multiple cuticular spines (Nwufoh *et al.*, 2019).

Fungal infection

Fungal infection in various regions of dogs showed alopecia, hyperpigmentation, erythema and musty odour. The tap impression smear revealed the septate hyphae with conidia radiating outwards. Skin scrapings from the affected animals were inoculated in SDA which showed growth of yellow green colonies of *Aspergillus* spp. (Fig. 5) (Mohammed *et al.*, 2017).

Based on etiological agents, the incidence were found to be the highest for the following:

- i. Bacterial infection – non descript (11.76%) followed by Labrador (9.8%)
- ii. Parasitic infections - non descript breed (9.8%)
- iii. Fungal infections - non descript breed (11.76%).

Most lesions relating to parasitic infestations were observed in younger dogs. Rahman *et al.* (2021) reported that mites, being sebophilic led to higher incidence of demodicosis in younger age group of dogs that might be due to increased stimulation of sebaceous glands during puberty.

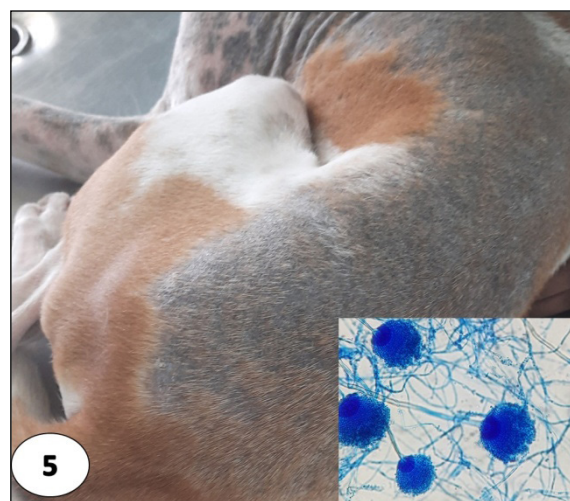


Fig. 5: Severe alopecia and hyperpigmentation on dorsal side of the body. Inset: Septate hyphae of *Aspergillus* with conidia radiating outwards. Lactophenol cotton blue $\times 400$

Fungal dermatitis were found to be seasonal and occurring in the summer months when it was warmer and higher humidity was observed (Thakur *et al.*, 2020). Another four cases were found to be recurrent due to the immunocompromised condition as well as non-specific dermatitis (Mohammed *et al.*, 2017).

The cutaneous lesions were more severe and complicated in mixed infections. In the present study, combined infection of bacteria and demodicosis in two cases and

one case with bacterial and fungal infection. The mixed infection, complications and longer recovery period might be related to several factors like the difference in individual's immunity, poor management, poor body condition, lack of health treatment and improper nutrition (Akter *et al.*, 2018).

The frequent contact with ground and hypersensitivity to the pollutants on ground along with failure of managemental practices might be the predisposing factors for non specific dermatitis (Singh *et al.*, 2012).

Non specific dermatitis may also attribute to autoimmune diseases like systemic lupus erythromatosis which causes crust formation, scaling and alopecia, pruritus, erythema and eruptions at mucocutaneous junctions (Bennett, 1984). Pemphigus foliaceus and Pemphigus vegetans also affecting the skin causing pustule formation, alopecia and pruritus. Fouda *et al.* (2021) reported that canine endocrine dermatopathology, most commonly hypothyroidism and hyperadrenocorticism represents 8.6% of the dermatological diseases, most commonly exhibiting symptoms of non pruritic bilaterally symmetrical alopecia developing chronically.

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