

Pathology of canine demodicosis

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Abstract

Out of the 80 dermatitis cases studied in dogs, 17 were demodicosis cases. The affected dogs belonged to two to six years of age group. Grossly, papules, pustules, nodules, alopecia, scaly, crusty, hyperpigmented and thickened skin were observed. Adults and immature stages were seen in skin scrapings. Neutrophils, lymphocytes and macrophages were seen in cytological preparations along with mites. Histopathological changes included dilated hair follicles with cross sections of demodex mites, hyperkeratosis, melanin pigment accumulation, furunculosis and extrafollicular inflammatory changes.

Keywords: Demodicosis, Dogs, Gross lesions, Histopathological changes.

Introduction

Demodicosis (red mange, follicular mange, acarus mange) is relatively a common disease of dogs. The lesions are caused by the presence of greater than the normal numbers of the mite *Demodex canis*, a cigar shaped parasite. The mite spends its entire life cycle on the dog, inhabiting the hair follicles and occasionally the sebaceous and pitrichial sweat glands. It is widespread, inflammatory, chronic contagious and debilitating skin disease of canines (Chatterjee, 1989). A shorter and broader form of the mite has also been reported but is considered to be uncommon (Henfrey, 1990). The study was aimed to record the occurrence and pathology of demodicosis in dogs.

Materials and Methods

Skin scrapings, hair pluck and impressions from the moist lesions and aspirates from the fluid filled cystic/nodular lesions, and blood and serum for clinicopathology and skin biopsies for histopathology were collected from the dogs brought to Small Animal Clinic of Madras Veterinary College, Chennai with a chief complaint of chronic skin disorders. Skin scrapings, hair plucks and squeezed contents were processed and examined according to methods described by Curtis (2001) and Moriello (2001). Packed cell volume (PCV), haemoglobin (Hb), total erythrocyte count (TEC), differential leukocyte count and

total leukocyte count (TLC) were determined by the methods described by the Coles (1986). Total protein and albumin were estimated by the modified Biuret and Dumas method (Varley *et al.*, 1980). The smears for the cytological studies were stained with haematoxylin and eosin (HE), May-Grunwald Giemsa (MGG) and Leishman-Giemsa stains (LG). The tissues for histopathological examination were fixed in neutral buffered formalin, embedded in paraffin and stained with HE.

Results

Out of 80 cases of dermatitis studied in dogs, 17 were positive for demodicosis. The affected dogs belonged to 2 months to 6 years of age group and among the affected dogs 13 dogs were below 3 years of age (76.47 per cent). Purebred dogs constituted 10, of which Doberman was frequently affected followed by Great Dane. Ten were females and seven males. Generalised lesions were observed in 12 cases and localised lesions in five.

Gross lesions: Out of 17 cases, 12 were generalised demodicosis, four were localised demodicosis and one was a pododemodicosis case. Generalised demodicosis cases showed generalised patchy, alopecic, papulo-pustular, crusty, scaly and hyperpigmented lesions with thickening of the skin (Fig. 1). Two cases showed cystic swellings (1 cm diameter) over the face. Localised demodicosis showed alopecia, erythematous papules, pustules, hyperpigmentation (Fig. 2) and scaly lesions, located over face, anterior elbow, ventral aspect of the neck, periorbital and mucocutaneous junctions. Haemorrhagic bullae and

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oedema of the fore legs were seen in a Spitz. Pododemodiosis case revealed oozing lesions, haemorrhagic bullae with ulcerations of nail bed, pustules, hyperpigmentation and oedema.

Skin scrapings: The deep skin scrapings along with squeezed contents revealed the presence of eggs, larvae,



Fig. 1. Demodicosis-Doberman-3 years -Male -Generalised lesions



Fig. 2. Demodicosis-Spitz-2 years Male-Localised lesions.



Fig. 3. Demodicosis-Skin Scraping-Egg, surrounded Nymph, larvae and adult x 400

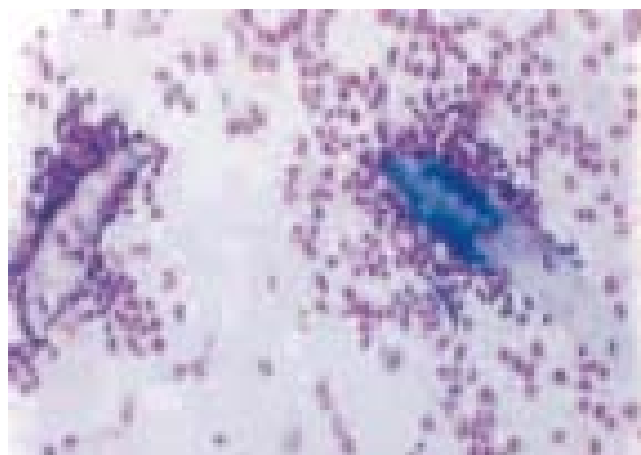


Fig. 4. Demodicosis- Cytology-Mites surrounded by degenerate neutrophils - LG x 320

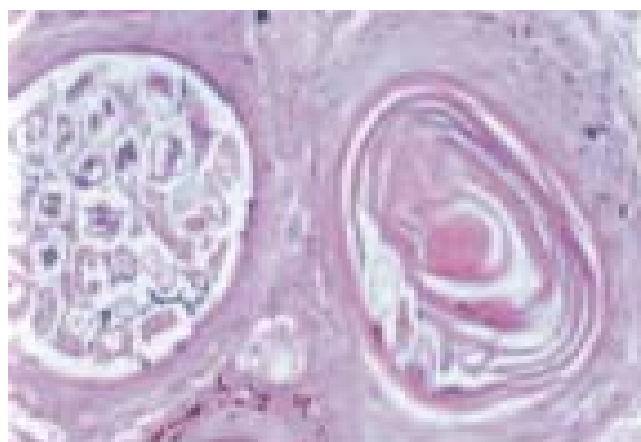


Fig. 5. Demodicosis- Skin- Hair follicles showing cross-sections of the mites H&E x 320

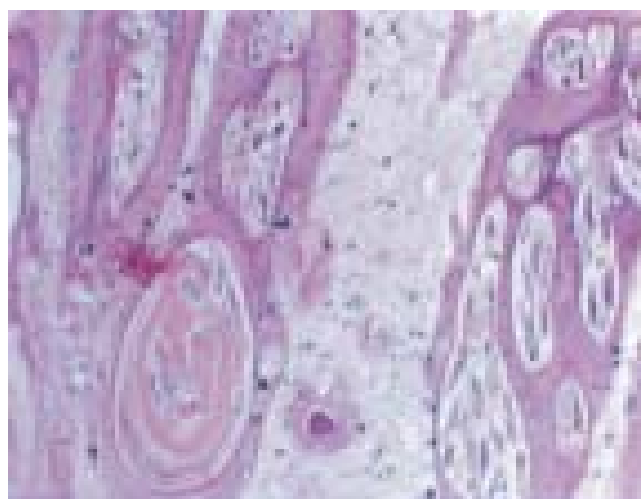


Fig. 6. Demodicosis- Skin- Hair follicles showing cross sections of the mite H&E x 320 longitudinal sections of the mites H&E x 320

nymphs and adult mites (Fig. 3) in all 17 cases. In two cases, mites which resembled short tailed demodectic mites were found attached to the surface crust. In other cases long bodied mites were present.

Cytology: The impression smears from the dry lesions revealed only mature and immature keratinocytes. Oozing lesions revealed neutrophils, RBC's, lymphocytes and cocci. The smears from squeezed contents revealed mites along with degenerate neutrophils (Fig. 4) and sometimes a few macrophages and lymphocytes.

Hair pluck: In all the 17 cases studied, the hairs plucked from the squeezed follicles revealed live adult mites and developing stages

Haematobiochemistry: The Hb, PCV and TEC values were significantly ($P < 0.05$) low with eosinophilia (Table 1). The total protein values were significantly ($P < 0.05$) higher with an increase in globulin levels ($P < 0.05$).

Histopathology: Nine biopsy samples were studied. Basket weave type of orthokeratotic hyperkeratosis with mild acanthosis and melanosis of the outer follicular epithelium and basal layer of the epidermis were observed. The hair follicles distended with the cross (Fig. 5) and longitudinal sections (Fig. 6) of the mites and eggs. Perifolliculitis with massive infiltration of polymorphs, and few eosinophils and furunculosis were found. Mite segments were seen outside the follicles surrounded by intense neutrophilic infiltration along with a few macrophages, epithelioid cells and giant cells. Focal parakeratosis, perifollicular and periadnexal fibrosis and mural folliculitis with cross sections of mite in the epidermal crust were seen in a solitary case.

Table 1. Haemato-biochemical changes in demodicosis in dogs

Parameters	Control	Demodicosis
Hb (g/dl)	11.33 $\pm$ 0.59	8.5* $\pm$ 0.5
PCV (%)	36.6 $\pm$ 2.12	30.0* $\pm$ 1.77
TEC (x10 ⁶ /ml)	5.42 $\pm$ 0.24	4.36* $\pm$ 0.23
TLC (x10 ³ /ml)	9860 $\pm$ 440.17	13860.53 $\pm$ 1435.62
Neutrophils	7120.90 $\pm$ 357.87	10074 $\pm$ 1210.11
Lymphocytes	2258 $\pm$ 129.20	2829 $\pm$ 388.2
Monocytes	334 $\pm$ 45.11	95.05 $\pm$ 52
Eosinophils	294.4 $\pm$ 63.11	837.11 $\pm$ 149.95
Total protein	7.13 $\pm$ 0.16	7.97* $\pm$ 0.18
Albumin	3.09 $\pm$ 0.15	3.30 $\pm$ 0.13
Globulin	4.04 $\pm$ 0.13	4.67* $\pm$ 0.19

Discussion

Gross lesions: Localised demodicosis cases showed alopecia, papulo-crustaceous and hyperpigmented lesions in the head, neck, legs and chest which were the main areas of contact between the bitch and puppies. These findings were also described by Henfrey (1990). Generalised demodicosis cases showed papulocrustaceous lesions with thickened skin and hyperpigmentation in the present study, which were in accordance with the findings of Nedunchelliyan (1989) and Caswell *et al.* (1999). In addition erythematous papules with yellowish crusts were seen in early stages. Two cases showed cystic swellings over the face containing a serosanguineous fluid. The pododemodicosis was characterised by thickening of the paws, interdigital haemorrhagic bullae and pustules with draining tracts. Similar changes were also described by Henfrey (1990) and Sarkar *et al.* (2002).

Skin scrapings: Samples from deep dermis yielded adult mites, juvenile forms and eggs in significant numbers, which agreed with the findings of Henfrey (1990) and Curtis (2001). In two cases mites resembling short tailed demodectic mites were found in the superficial scrapings, which were similar to the description given by Saridomichelakis *et al.* (1999).

Haemato-biochemistry: Anaemia and leucocytosis with neutrophilia and eosinophilia, reduced albumin and increased globulin levels recorded in the study agreed with the findings of Jayagopal Reddy *et al.* (1992), Aujla *et al.* (2000), Bhosale *et al.* (2000) and Wadhwa *et al.* (2002). The elevated protein values could be due to associated deep pyoderma and reduced albumin levels could be due to loss through inflammatory exudates and relative increase in the globulin levels.

Histopathology: Infiltration of neutrophils in the dermis and distended follicles with cross and longitudinal sections of the mites were observed. Perifolliculitis and mural folliculitis seen in the present study could be due to inflammatory reaction incited by the injured follicle (Nedunchelliyan, 1989; Aujla *et al.*, 2000). The pyogranulomatous reaction seen surrounding the extrafollicular mites could be due to the reaction induced by the mites which acted as a foreign body and due to secondary bacterial infection. One case showed cross section of the mite in the stratum corneum which could be a short tailed demodectic mite (Saridomichelakis, 1999).

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