J Parasit Dis (Oct-Dec 2015) 39(4):673–676
DOI 10.1007/s12639-013-0405-3

ORIGINAL ARTICLE

Demodicosis caused by *Demodex canis* and *Demodex cornei* in dogs

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Received: 18 July 2013 / Accepted: 11 November 2013 / Published online: 26 November 2013

Abstract Two mongrel dogs aged between 7 and 9 months in a same house were presented to the clinics with a history of chronic dermatitis associated with pruritus. Clinical examination revealed presence of primary and secondary skin lesions on the face, around the ears, chin, neck, fore limbs and lateral abdomen. Examination of skin scrapings revealed *Demodex cornei* (majority) and *D. canis* (minority) in both the dogs. By using hair pluck examination *D. canis* were detected and by tape impression smears examination large number of adult short-tail *Demodex* mites were found. *D. cornei* was identified by based on the morphological characters including short opisthosoma with blind and round terminal end. Mean length of total body, opisthosoma of both types of the mites were differed statistically significant ($P < 0.01$) but gnathosoma and podosoma did not differ significantly ($P > 0.05$). Dogs were treated with daily oral ivermectin @ 500 µg/kg/day, external application of amitraz along with supportive therapy. After completion of 45 days of therapy dogs were recovered completely without any side effects.

Keywords Demodicosis · *Demodex cornei* · *Demodex canis* · Dogs

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Introduction

Canine demodicosis is one of the well known skin diseases encountered in veterinary practice. It is a dermatologic disease that occurs when mites colonize the hair follicles, sebaceous glands. Dermatological changes include erythema, alopecia, comedones, follicular hyperkeratosis, pustules, crusts and seborrhea. Often, a secondary pyoderma further complicates the disease (Scott et al. 2001). *Demodex canis* was the main causative agent of canine demodicosis and it is characterized by the presence of large numbers of *Demodex* mites. The three recognized canine *Demodex* mites are: *Demodex canis*, *Demodex injai*, and the unnamed short-bodied mite. *Demodex canis* was the first to be identified and named the two additional *Demodex* mites may be mutations of *Demodex canis*, or separate species (Scott et al. 2001). Hillier and Desch (1997) described *Demodex injai,* a long bodies demodecid, where the male mites were more than twice the length of the males of *D.canis* (Desch and Hillier 2003). In another report an unusual mite was reported by Scarff (1988). Stubby form of the *Demodex* was described as being about one half of the length of the female of *D.canis* (Chesney 1999). Currently, the reports about *D. cornei* infestation in dogs are very few in India, although the first report was published in 1998 (Scott et al. 2001). This paper reports the occurrence of mixed *Demodex* infestation of *D. cornei* and *D. canis* in dogs and its management.

Materials and methods

Two mongrel dogs aged between 7 and 9 months belongs to a same house was brought to the Veterinary Hospital, Proddatur with a history of skin lesions associated with

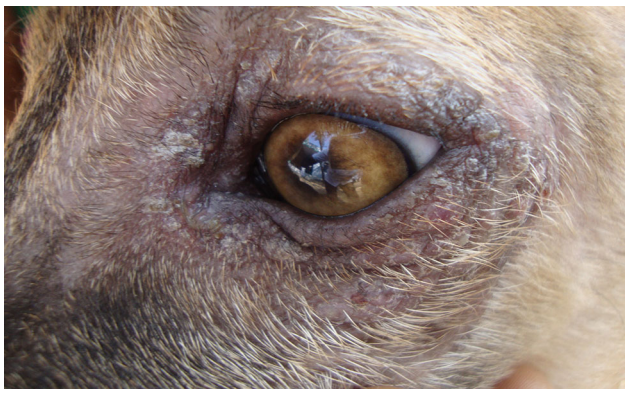

Fig. 1 Dog affected with Demodicosis—Periorbital lesions

pruritus from One month. Upon clinical examination, dogs exhibited papules, pustules, erythema, alopecia, hyperpigmentation, erosions, lichenification and cellulitis. Distribution of lesions observed on face, around the eyes and ears, chin region, fore limbs, neck and lateral abdomen (Fig. 1). Skin scrapings, tape impression smears and hair plucks was collected from the affected dogs for laboratory examination. Scrapings were collected with scalpel blade dipped in liquid paraffin and collection of scrapings was continued until there was slight ooze of blood from dermal capillaries. Material was suspended in a few drops of liquid paraffin on a microscopic slide, a coverslip was applied and the preparation was examined under low and high power (10X, 40X) of microscope. The acetate tape impression smears was used to investigate superficial mites. The sticky surface of the tape was pressed on the suspected lesions, and tape was then mounted directly on a glass slide. The glass slides were examined under compound microscopes with 10X and 40X of magnification. Few tape impression smears were stained with new methylene blue for 1 min and examined under 100X (Rosenkrantz 2008).

Results and discussion

Skin scrapings collected from the head region, revealed different stages of *Demodex* mites (Fig. 2) along with few ovigerous female mites (Fig. 4a). *D. canis* were found in hair pluck examination technique. The tape impression technique of the dogs revealed more number of short-tail *Demodex* mites (*D. cornei*). Cytology of impression smears revealed cocci, cocci engulfed by neutrophils which indicate involvement of secondary bacterial infection. Based on the history, lesions and laboratory findings, the present case was diagnosed as generalized superficial demodicosis of *D. cornei* and generalized follicular demodicosis of *D. canis* with secondary bacterial pyoderma. Dogs were treated with oral ivermectin at 500 µg/kg/day for 45 days by regular monitoring for the side effects. Ampicillin at 25 mg/kg twice a day orally, BID for 14 days was given to control secondary bacterial infection. After one week of antibiotic therapy, amitraz (2 ml in 1 litre of water) was given weekly twice as topical application followed by bath with benzyl peroxide (petben) shampoo up to the recovery period. One week after therapy moist lesions and scales was disappeared and dogs had mild pruritus. 2 weeks after treatment, the number of surface *Demodex* mites detected by the tape preparation technique was gradually decreased and the dogs were free from pruritus, erythema, erosions, and ulcers. One month after treatment, the general skin condition was improved; absence of pruritus was noticed and number of surface *Demodex* mites was also decreased. Complete disappearance of mites and re-growth of hair was noticed after 45 days of after therapy.

Mites with short tail were identified as *D. cornei* based on other morphological characteristics. Mites present in the tape impression smears had elongated body with short stumpy legs on podosoma and shorter opisthosoma. The measurements were carried out on the gnathosoma length, podosoma length, opisthosoma length and total body length. The adult mites were measured in microns by using ocular and stage micrometers under compound microscope. Measurement data of twenty-six adult (males and females) *D. cornei* mites of this study were reported. Twenty-six mounted adults of *D. canis* were measured under the microscopes and the following measurement data were also recorded in Table 1. In the present study, the mean total body length (132.21 ± 14.6 µm) of *D. cornei* (Fig. 3) was much less than that of *D. canis* (Fig. 4) (214.32 ± 13.81 µm). The mean total body length of the mites obtained from deep skin scrapings i.e. *D. canis* was almost agreeable with Chesney (1999) (226.1 ± 11.68 µm) and Gortel (2006) (224 µm). The mean body length of *D.cornei* obtained from the tape impression smears (132.21 ± 14.6 µm) was in accordance with Tamura et al. (2001) who reported unidentified subspecies with a short opisthosoma, an obtuse end and with

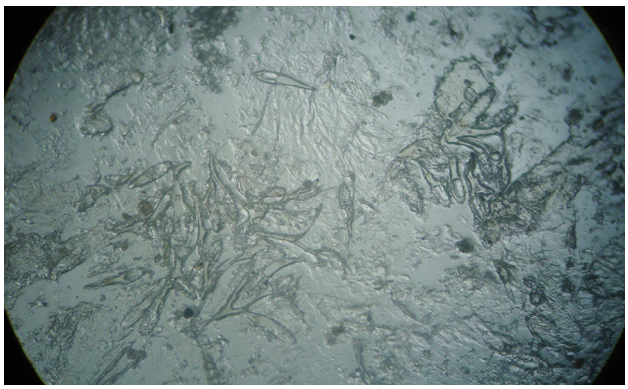

Fig. 2 *Demodex* mites in skin scrapings (10X)

Table 1 Micrometry of *D. canis* and *D. cornei* adult mites

Parameters	*D. canis*	Range	*D. cornei*	Range	*P* value
Gnathosoma	18.89 ± 0.18[a]	18–20	19.11 ± 0.14	18–20	0.141
Podosoma	60.98 ± 0.21[a]	59–62	61.06 ± 0.31	59–64	0.054
Opisthosoma	129.68 ± 3.34**	110–152	61.48 ± 2.4	49–76	0.001
Total body length	214.32 ± 13.81**	158–271	132.21 ± 14.6	96–152	0.001

* Significant ($P < 0.05$)

** Highly significant ($P < 0.01$)

[a] Non significant ($P > 0.05$)

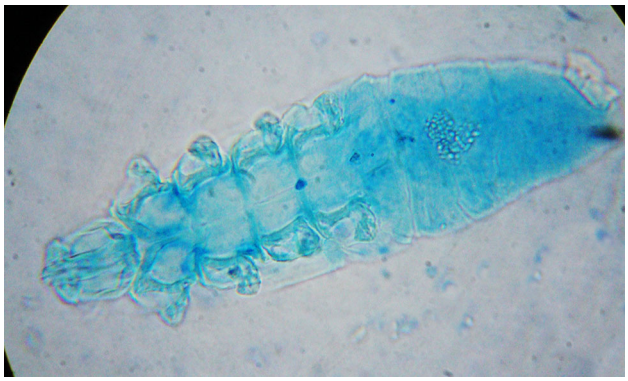

Fig. 3 Ventral view of the adult *D. cornei* in tape impression smears (40X)

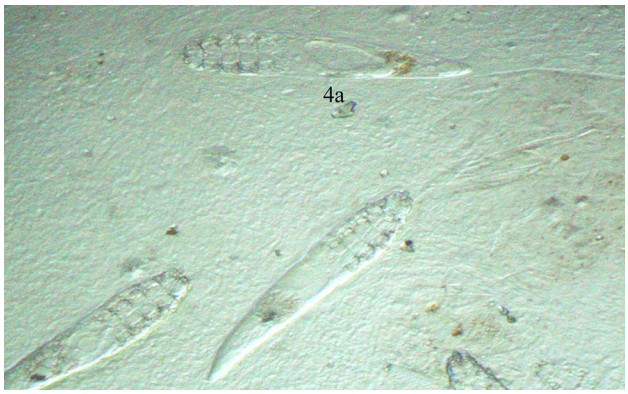

Fig. 4 Ventral view of the ovigerous female of adult *D. canis* in scrapings (20X)

mean body length of 139 ± 21.6 µm. Similarly Lopez et al. (2011) and Chesney (1999) reported the mean length of *D. cornei* was 139.3 ± 10.4 µm and 122.6 ± 12.0 µm in their studies respectively. All the measurements of both types of mites were analyzed using Student's *t* test. Lengths of total body and opisthosoma of both types of the mites differed statistically significant ($P < 0.01$) while podosoma and gnathosoma did not differ significantly ($P > 0.05$). Differentiation of the both the mites (*D. cornei* and *D. canis*) mainly based on their size, inhabitant or location of the mite and morphological difference. The mite collection technique can also give a useful diagnostic data, because *D. cornei* inhabits in stratum corneum of epidermis, the suitable collection technique for *D. cornei* is superficial skin scraping or using tape preparation techniques, while the habitat of *D. canis* is hair follicles and sebaceous glands which move deeper into layer of dermis, so it may concluded that the suitable collection techniques for *D. canis* are deep skin scraping or hair-plucking examination. From mite sizes, *D. cornei* is seemed obviously shorter than *D. canis* (Tamura et al. 2001; Patterson 2008; Tater and Patterson 2008). In the present study clinical manifestations of *D. cornei* infestation in dogs was in the form of a scaly and prurutic skin diseases, which was relevant to the previous report of Mason (1993) and Tater and Patterson (2008).

Conclusion

The short tailed *Demodex* mites collected from the two dermatitis dogs in this study were *D. cornei*. They had short opisthosoma and blunted posterior end when compared with *D. canis.* The mean total body length of short form of *Demodex* spp. was 132.21 microns while the mean total body length of *D. canis* was 214.32 microns.

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