

## Morphometry Of Demodex Canis And Demodex Cornei In Dogs With Demodicosis In India

Review Article

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### Abstract

In the two years period of research on canine dermatology at College Hospital of College of Veterinary Science Tirupati, 32 dogs with dermatological problems found to have demodicosis. In these cases demodicosis was confirmed by clinical examination, microscopic examination of scrapings and tape impression smears collected from the lesions. In these two different types of *Demodex* mites were identified based on their habitat and morphology along with micrometry. Micrometry was carried out on 320 mites of two different types of *Demodex* collected from all the cases. *Demodex canis* was identified in skin scrapings with pointed opisthosomal terminal end and mean body length of  $211.81 \pm 14.86 \mu\text{m}$  and mean width of  $37.68 \pm 0.31 \mu\text{m}$ . *Demodex cornei* was noticed in tape impression smears and identification was based on its morphology (stubby form with a blunt posterior opisthosoma end) and its mean length of  $137.15 \pm 37.72 \mu\text{m}$  and mean width of  $38.28 \pm 0.19 \mu\text{m}$ . Lengths of total body and opisthosoma of both types of the mites differed statistically significantly but, gnathosoma and podosoma did not differ significantly.

**Key Words:** *Demodicosis*; *D.Canis*; *D.Cornei*; Morphometry; Dogs

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### Introduction

Canine demodicosis is a common dermatosis in dogs. Demodicosis is one of the important parasitic skin diseases resulting from excessive proliferation of the mite *Demodex canis* within the hair follicles [1]. The diagnosis of canine demodicosis is usually done by identifying mites in skin scrapings, hair pluck, acetate tape preparations, otic swabs and histopathology may be used depending upon the lesion and nature of location of lesion [2,3]. Follicular mite, *Demodex canis* is the most common species; there have been two other morphologically different types of *Demodex* mites being reported in different countries in the recent past. They include a short – bodied, stubby, *Demodex cornei* with a blunt terminal end that lives in the superficial layers of the stratum corneum [4,5] and *Demodex injai*, a long bodied mite, an inhabitant of canine pilosebaceous unit [5]. In India reports on morphometry of

*Demodex* mites was scanty. Hence, in the present investigation was made to study the morphometry of two *Demodex* mites, i.e. *D.canis* and *D. cornei* in dogs with demodicosis as they can be identified based on morphology and its measurements.

### Materials and Methods

Thirty two dogs (Figure:1 and 2) aged between six months to eight years of both the sexes were found to have demodicosis during the two years of research period in College Hospital of College of Veterinary science, Tirupati. All the Dogs exhibited papules, pustules, erythema, alopecia, ulcers, hyperpigmentation, erosions, lichenification, pruritus, pain, cellulitis and furunculosis. Distributions of lesions were noticed at face, fore limbs, hind limbs, lateral abdomen, neck and dorsum regions. From all the dogs with different skin lesions, skin scrapings, tape impression smears and hair plucks were collected for laboratory examination. Deep scrapings were collected by continued scrapings 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 power and high power (10X, 40X) of microscope. Tape impression smears also collected from all the dogs with dry skin lesions on body surface, in this few smears were examined directly under microscope and few smears were stained by using new methylene blue stain for one minute. The stained smear was then dried and examined under 10X,40X for the presence of mites of *Demodex* [6,7]. The hair plucks were collected using hemostat forceps, mounted on a glass slide with mineral oil, cover slip placed and examined under low power of microscope for the presence of *Demodex* mites. Smears of processed skin scrapings and tape impression smears of the dogs were used for morphological studies and measurements of the mites. Total of 320 mites of *Demodex canis* and 320 mite of *Demodex cornei* collected from all the dogs with demodicosis for their morphology and micrometry of gnathosoma, podosoma, opisthosoma and total body length along width of both

Figure 1. Localised demodicosis in a boxer



Figure 2. Generalised demodicosis in a mongrel



the mites.

## Results and Discussion

Skin scrapings collected from all the 32 dogs with demodicosis revealed live mites of *Demodex* having long opisthosoma with pointed posterior end. Upon measurement of 320 adult (male and female) mites revealed total body length of 156-269  $\mu\text{m}$  with a mean value of  $211.81 \pm 14.86 \mu\text{m}$  and width of 35-41  $\mu\text{m}$  with mean width was  $37.68 \pm 0.31 \mu\text{m}$ . Hence they were arbitrarily considered as *D. canis* (Figure:3). Tape impression smears taken from all the 32 dogs revealed, mites in 18 dogs with short, stumpy body with blunt opisthosomal posterior end. Morphometry examination was carried out on 320 adult (male and female) mites measured 96-164  $\mu\text{m}$  of length and 36-41  $\mu\text{m}$  of width with a mean value of  $137.15 \pm 22.84 \mu\text{m}$  of length and  $38.28 \pm 0.19 \mu\text{m}$  of width. These mites were seen in tape impression smears and not observed in the hair pluck. Hence arbitrarily they were taken as *D. cornei*. *D. cornei* mites were diagnosed on tape impression smears only.

Micrometry of both the mites was mentioned in the table-1. The mean total body length of the mites obtained from deep skin scrapings i.e. *D. canis* was almost agreeable with Chesney

[4] ( $226.1 \pm 11.68 \mu\text{m}$ ), Sakulpoy and Sangvaranond [8] ( $217.83 \pm 30.06$  microns), Gortel [9] (224  $\mu\text{m}$ ). The mean length of short mites obtained from the tape impression smears were  $137.15 \pm 12.84 \mu\text{m}$  of mean length. These findings were in accordance with Tamura *et al.* [10] who reported unidentified subspecies with a short opisthosoma and an obtuse end, short and wide body compared to *Demodex canis* with a body length of  $139 \pm 21.6 \mu\text{m}$ . Similarly Sakulpoy and Sangvaranond [8] and Lopezj *et al.* [11] reported the length of *D. cornei* 132.5 – 187.5 microns (mean  $156.92 \pm 11.12$ ) and 120-155  $\mu\text{m}$  (mean  $139.3 \pm 10.4$ ) respectively. But, Saridomichelakis *et al.* [12], reported that the short tailed demodectic mite had a shorter body (145 to 200  $\mu\text{m}$ ; mean  $165 \pm 19 \mu\text{m}$ ). Chesney [4] reported a shorter and stubbier form of *Demodex* species with the size ranging from 90-148  $\mu\text{m}$  (mean  $122.6 \mu\text{m}$  SD 12.0  $\mu\text{m}$ ) in their studies. Though *D. cornei* was initially reported in four countries over three continents [13], the seemingly worldwide distribution of the parasite suggested that it is not uncommon and is merely overlooked or unrecognized. Measurements of width of the adult mites of *D. canis* were 35 – 41  $\mu\text{m}$  ( $37.68 \pm 0.31$ ), *D. cornei* 36-41  $\mu\text{m}$  ( $38.28 \pm 0.19$ ). These findings were similar to the Izdebska [14] who reported the range of width of *D. canis* (35-43  $\mu\text{m}$ ) and *D. cornei* (35-40  $\mu\text{m}$ ). Lengths of total body and opisthosoma of both types of the mites differed statistically significant

Figure 3. Adult Demodex canis in skin scraping

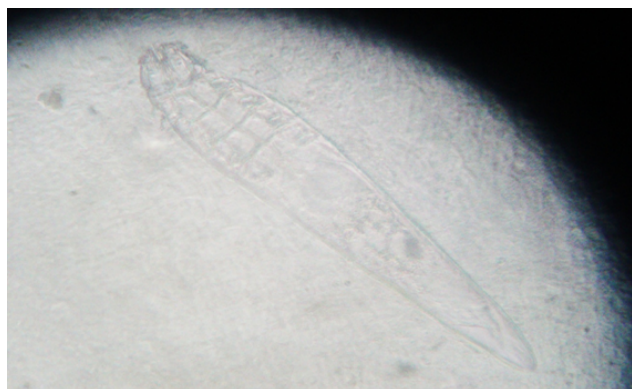


Table 1. Micrometry of Demodex mites

Parameters	<i>Demodex canis</i> (n:320)		<i>Demodex cornei</i> (n:320)		t-test	P-value
	Mean	Range	Mean	Range		
Gnathosoma	19.52 ±0.10	19-20	19.28 ±0.11	18-20	1.41	0.16
Podosoma	62.68 ±0.33	60-65	61.56 ±0.62	58-65	1.94	0.05
Opisthosoma	130.52 ±2.47**	110-147	58.56 ±1.58	46-72	24.49	0.00
Total body length	211.81 ±14.86**	156-269	137.15 ±22.84	96-164	13.95	0.00
Width	37.68±0.31	35-41	38.28±0.19*	36-41	1.35	0.18
Ratio of prosoma to opisthosoma	0.62 ±0.02**		1.37 ±0.04			

(P: 0.00) while gnathosoma and podosoma did not differ significantly (Table 1). Significant difference (P: 0.00) was also observed between the ratio of prosoma to opisthosoma in the two mites. There are no distinguishing features of history or clinical symptoms specific to *D. cornei* [2] and the symptoms may mimic classic *Demodex* infestation [15] also observed in the present study. *Demodex cornei* could be a mutant of *D. canis* or a new species [13]. The mites observed in deep skin scrapings and hair pluck were taken as *D. canis* based on their morphology i.e. pointed opisthosomal terminal end and size ranging from 250-300 µm. Though *D. injai* can also be found in deep skin scrapings, it would be much longer as its total body length was 334 - 368 µm [16]. In recent publications it was suggested that short-tailed *Demodex* mite may also be *D. canis* but may live on the surface of the epidermis. However, further genetical studies evaluating these mites (PCR test) will be needed to determine if these are indeed different species or just different forms of the same species [17]. If it were to be true, *D. cornei* should be found in every case of demodicosis. But in the present study, short stumpy *Demodex* mites were recorded in 18 out of 32 dogs i.e 56.25 % of cases and always associated with *D. canis*.

In conclusion observation on the habitat of mites, its morphology and micrometry of opisthosoma, total body length and ratio of prosoma to opisthosoma will help to differentiation both the *D.canis* and *D.cornei* mites in dogs.

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