



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2017; 5(6): 1776-1779

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Received: 11-09-2017

Accepted: 13-10-2017

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Morphometry of demodex species of canines in Hyderabad region of Telangana state

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Abstract

The present study was conducted for studying the morphometric measurements of *Demodex* species Dogs for a period of six months December 2015- June 2016. Dogs showing clinical signs like alopecia, itching, erythema, papules and pustules were selected. Processed skin scrapings and acetate tape impression smears were collected from the areas of dermatological lesions of the dogs were used for measurements of the mites. The mean body length and width of *Demodex canis*, *Demodex cornei* is $216.95 \pm 2.07 \mu\text{m}$, $37.07 \pm 0.18 \mu\text{m}$ and $148.02 \pm 1.12 \mu\text{m}$, $37.37 \pm 0.54 \mu\text{m}$ respectively. Mean length of total body, gnathosoma and opisthosoma of both types of mites differed and found to be statistically significant, whereas podosoma length and body width of both *Demodex canis* and *Demodex cornei* did not differ significantly.

Keywords: *Demodex canis*, *Demodex cornei*, Morphometry, Demodicosis

1. Introduction

Demodicosis is one of the most common inflammatory parasitic skin diseases, characterized by an excessive proliferation of mites in hair follicles and surfaces [1]. Canine demodicosis is probably the best and most important example of overgrowth-induced disease. *Demodex* mites are part of the normal fauna of the dog, and mites are present in the hair follicles of healthy dogs and genetically preprogrammed immunological defect is responsible for the exaggerated replication of mites in demodicosis [2].

Demodex canis is the canine commensal follicular mite and is found in most dogs soon after Birth [3, 4, 5]. The *Demodex canis* mite develops through four life stages: a fusiform egg, a six legged larva, nymph and an adult [6]. Puppies and kitten acquire the mites during nursing in first 72 hours after birth. Except for this short period, the mites are not considered to be contagious. The life cycle probably takes 20-35 days [7]. Transmission of mites between canine hosts takes place soon after birth while the pups are feeding from the dam. Initially, mites are found on the head and fore limbs of newly. It is generally accepted that mites are not transmissible between adult dogs under normal circumstance [8]. If a puppy is stillborn and delivered by caesarean section or not nursed, no mites are found, therefore, there can be no transmission through uterus [9].

In addition to *Demodex canis*, two less common species of *Demodex* mites have been reported in the dog [10]. They include a short body, stubby, *Demodex cornei* with a blunt terminal end that lives in the superficial layers of the stratum corneum and *Demodex injai*, a long bodied mite, an inhabitant of canine pilo sebaceous unit [11]. Hence, the present study was conducted to study the morphometry of *Demodex* species found in and around Hyderabad region of Telangana State.

2. Materials and Methods

In the present study, the material was collected for studying the morphometric measurements of *Demodex* species of dog suffering from alopectic skin lesions for a period of six months December 2015 to June 2016. 160 canine skin-scraping samples were collected, out of which 88 were stray dogs and 72 were from pet dogs collected from different hospitals in Hyderabad for evaluation of morphometry.

Dogs showing clinical signs like alopecia, itching, erythema, papules and pustules were selected. Deep skin scrapings were collected by using rounded scalpel blade no 10 by scrapping the blade back and forth over the skin until capillary bleeding is evident. Affected skin fold was squeezed between the fingers to extrude the mites from the follicles and

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sebaceous glands before the scraping is done. Infected material was suspended in a few drops of glycerine on a microscopic slide, a coverslip was applied and the preparation was examined under low power and high power (10X, 40X) of microscope. Acetate tape impression smears collected from dogs with dry skin lesions on body surface and examined directly under microscope. Laboratory calibrated ocular and stage micrometer under bright field microscope (Olympus) was used to measure *Demodex* species total body length and width, length of gnathosoma, podosoma, opisthosoma; length and width of egg and larva ^[1].

2.1 Statistical analysis

The mean & standard error values were calculated and tested for significance by using t-test ^[12].

3. Results and Discussion

Demodex canis with characteristic features like cigar shaped body divided into Gnathosoma, podosoma bearing four pairs of stumpy legs, and Opisthosoma which was transversely striated on the dorsal and ventral surfaces were observed. Gnathosoma bore mouth parts showing paired palps, chelicerae and an unpaired hypostome. Podosoma had epimeral plates located on its ventral surface which were trapezoidal in shape. Opisthosoma was long and slender tapering to the posterior end. Eggs of spindle shape (Fig. 3) were observed. Larva with three pairs of legs (Fig. 4) distinguishing from adult and octopod nymphal stage was observed. Short – bodied “stubby” *Demodex* mites with morphological features like short opisthosoma with round terminal end were observed during the microscopic study of acetate tape impression smears. These short forms were *Demodex cornei* (Fig. 2).



Fig 1: Photomicrograph showing (G) Gnathosoma, (P) Podosoma, (O) Opisthosoma of *Demodex canis*.



Fig 2: Photomicrograph showing an arrow indicating rounded end of Opisthosoma of stubby *Demodex cornei* (40X).

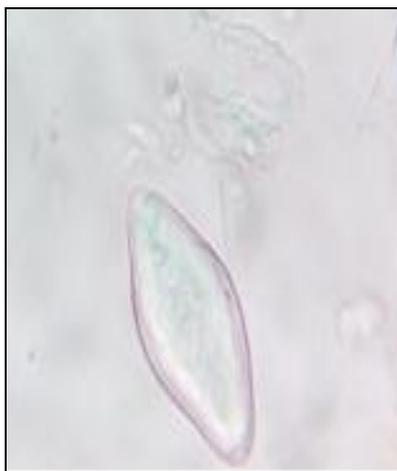


Fig 3: Photomicrograph showing an arrow indicating egg of *Demodex* sp. (10X).



Fig 4: Photomicrograph showing the larva with three pairs of legs of *Demodex* sp. (40X).

The morphometric measurements of *Demodex* species (n=172) were presented in (Table 1). Measurement of *Demodex canis* including adults (male and female) revealed

mean body length, mean body width, mean length of gnathosoma, podosoma and opisthosoma as $216.95 \pm 2.07 \mu\text{m}$, $37.07 \pm 0.18 \mu\text{m}$, $19.79 \pm 0.18 \mu\text{m}$, $62.62 \pm 0.2 \mu\text{m}$ and

134.67 ± 1.69 µm respectively.

Measurement of *Demodex cornei* including adult male and female mites revealed mean body length, mean body width, mean length of gnathosoma, podosoma and opisthosoma as 148.02 ± 1.12 µm, 37.37 ± 0.54 µm, 17.57 ± 0.16 µm, 62.28 ± 0.46 µm and 67.83 ± 0.89 µm respectively. The morphometric measurements of *Demodex* species egg and larva were

presented in (Table 2 and Fig. 5).

The mean length and mean width of *Demodex* species eggs were 81.15 ± 0.32µm and 31.09 ± 0.64 µm respectively (Table 2). The mean length and mean width of *Demodex* species larva were 96.08 ± 0.15 µm and 31.45 ± 0.04 respectively µm (Table 2).

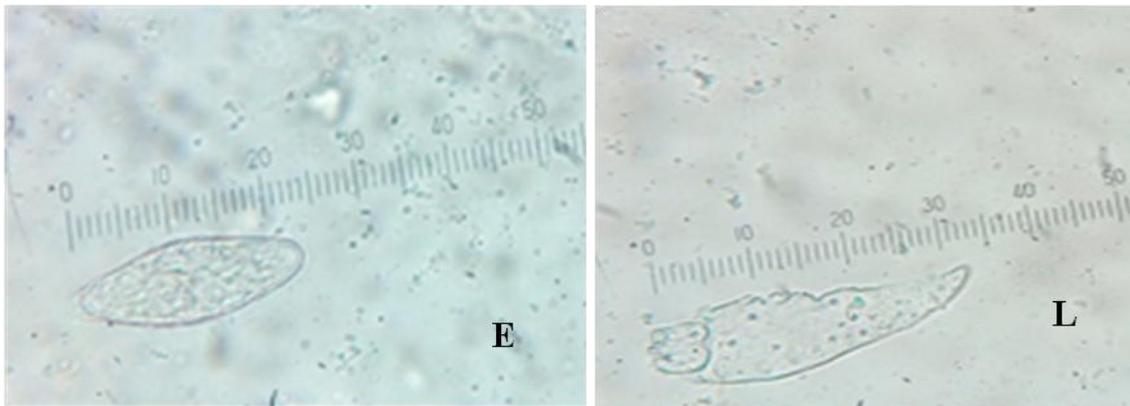


Fig 5: Photomicrograph showing morphometric measurement of (E) Egg and (L) Larva of *Demodex* spp. (40X).

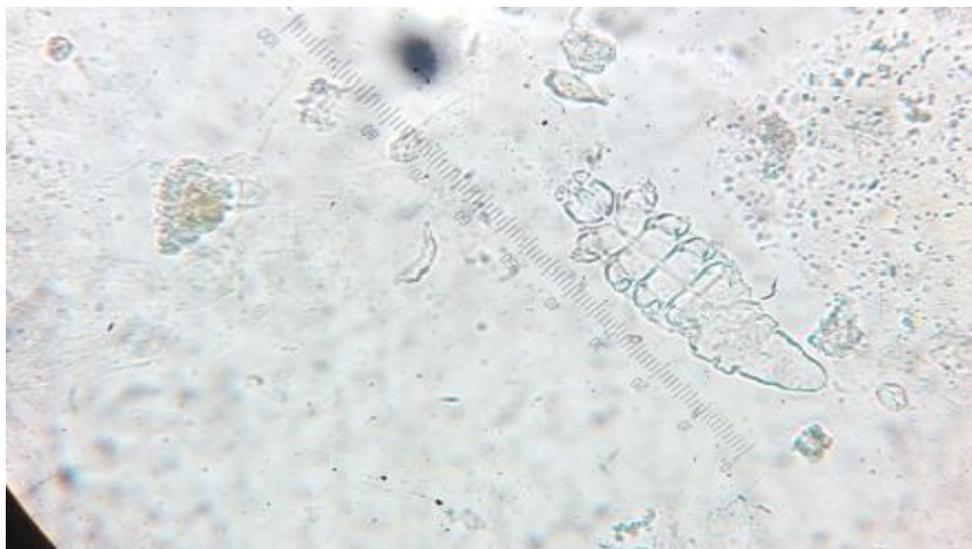


Fig 6: Photomicrograph showing morphometric measurement of adult *Demodex* sp. (40X).

Table 1: Morphometric measurements of *Demodex* species (n=172).

Parameters		<i>Demodex canis</i>	<i>Demodex cornei</i>	t-test	P-value
Adult Total body length (µm)		216.95 ± 2.07**	148.02 ± 1.12	32.54	0.00
Adult width (µm)		37.07 ± 0.18	37.37 ± 0.54	0.534	0.59
Gnathosoma (µm)	Length	19.79 ± 0.18**	17.57 ± 0.16	10.66	0.00
Podosoma (µm)		62.62 ± 0.2	62.28 ± 0.46	0.65	0.51
Opisthosoma (µm)		134.67 ± 1.69**	67.83 ± 0.89	38.82	0.00

** mark indicating difference in statistical significance (P<0.05)

Table 2: Morphometric measurement of *Demodex* sp. egg and larva.

Parameters	<i>Demodex</i> species	P value
Egg (µm)	Length	0.00
	Width	0.00
Larva (µm)	Length	0.00
	Width	0.00

Mean length of total body, gnathosoma and opisthosoma of both types of mites differed and found to be statistically significant, whereas podosoma length and body width of both *Demodex canis* and *Demodex cornei* did not differ significantly. The method of collection of skin scrapings was

similar with Soulsby (2012) [2]. Squeezing of skin fold between fingers over demodectic lesion before scraping yielded more number of mites. Harvested *Demodex* sp. appeared with morphological features like cigar shaped body divided into three distinct portions gnathosoma, podosoma and opisthosoma were observed similar to reported by Nutting (1976) [4].

The gnathosoma was bearing mouth parts consisting of paired palps and an unpaired hypostome, podosoma bearing four pairs of stumpy legs each were observed. Shortbodied “stubby” *Demodex*, short opisthosoma with round terminal end considered as *Demodex cornei* was observed which is

similar to reported by Sivajothi *et al.* [11]. Upon measurement of *Demodex canis*, mean body length and width, the mean length of gnathosoma, podosoma and opisthosoma were $216.95 \pm 2.07 \mu\text{m}$ and $37.07 \pm 0.18\mu\text{m}$, $19.79 \pm 0.18 \mu\text{m}$, $62.62 \pm 0.2 \mu\text{m}$ and $134.67 \pm 1.69 \mu\text{m}$ respectively which is almost similar to Sivajothi *et al.* [11] reporting mean body length and width as $211.81 \pm 14.86 \mu\text{m}$ and $37.68 \pm 0.31 \mu\text{m}$, mean length of gnathosoma and podosoma as $19.52 \pm 0.10 \mu\text{m}$ and $62.68 \pm 0.33 \mu\text{m}$ but showing difference in mean length of opisthosoma as $130.52 \pm 2.47 \mu\text{m}$. Measurement of *Demodex cornei* revealed mean body length of $148.02 \pm 1.12 \mu\text{m}$ which is almost similar to mean body length $165.0 \pm 19.0 \mu\text{m}$ with range of $145 - 200 \mu\text{m}$ of short tailed demodex mite reported by Saridomichelakis *et al.* [13]. The mean body width observed was $37.37 \pm 0.54 \mu\text{m}$ which is similar to Sivajothi *et al.* [11] reporting mean body width as $38.28 \pm 0.19 \mu\text{m}$. The mean length of gnathosoma, podosoma and opisthosoma observed were $17.57 \pm 0.16 \mu\text{m}$, $62.28 \pm 0.46 \mu\text{m}$, $67.83 \pm 0.89 \mu\text{m}$ where gnathosoma and opisthosoma length as $19.28 \pm 0.11 \mu\text{m}$, $58.56 \pm 1.58 \mu\text{m}$ is showing difference in measurements from Sivajothi *et al.* [11].

4. Conclusion

It is concluded that demodectic mange in dogs can be easily confused with many dermatological Conditions. Traditionally skin scraping is the only reliable and gold standard diagnostic method available and morphometry helps in the different species prevalent in different geographical locations and its characterization at species level diagnosis.

5. Acknowledgements

We Authors are thankful to Dean, Faculty of Veterinary Sciences of PVNR TVU for providing the financial support to conduct this research study and the fellowship to continue the Master's programme in the University.

Author contributions

1. Dr Lubna Fathima. It is the Part of MVSc thesis is submitted to PVNR TVU, CVSc, Hyderabad
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Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

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