Short Communications

Seroprevalence of vectorborne diseases in free-roaming dogs in Goa, India

A. E. Wise, R. E. Tarlinton

A majority of the Indian dogs are 'community dogs', semiferal dogs which are partially dependent on the human population and feral dogs. Communicable diseases may be a problem due to overcrowding, minimal veterinary care, and a climate favouring parasites and vectors. Some reports suggest that the vectorborne diseases, such as filariosis, babesosis and ehrlichiosis, are endemic throughout India. However, there is little information concerning disease epidemiology in Indian dogs (Megat Abd Rani and others 2010a).

Vectorborne diseases of dogs are of particular interest, as pathogens such as *Borrelia burgdorferi* sensu lato (the agent of Lyme disease) are a zoonotic risk in addition to causing disease in their canine hosts (Megat Abd Rani and others 2010a). The pathogens examined here, the tickborne *B burgdorferi* sensu lato, *Erlichia canis*, *Anaplasma platys* and the mosquito-borne *Dirofilaria immitis*, are regarded as endemic in the dog populations in warm climate zones, worldwide.

The reported prevalence of *E canis* within India varies with 0.35 per cent and 18.9 per cent of dogs identified with canine ehrlichiosis by stained blood smears in Punjab and Nagpur, respectively (Juyal and others 1994, Samaradni and others 2003, Megat Abd Rani and others 2010a). Studies in Chennai reported that 50 per cent of privately-owned dogs tested positive for *E canis* when using species-specific PCR compared with 19 per cent by microscopy (Lakshmanan and others 2007). Megat Abd Rani and others (2011) reported a PCR-based prevalence of 27.2 to 39.5 per cent of *E canis* in tropical and subtropical Delhi and Mumbai, but an absence of this pathogen in the more temperate climate zones of north-West Bengal and Jammu Kashmir.

D immitis has been reported in northern India. Borthakur and others (2006) identified 34 per cent of 240 dogs at a slaughterhouse in north-east India to be infected with *D immitis*, and Megat Abd Rani and others (2010b) reported 4.3 per cent of dogs in Delhi to be positive by PCR-based tests. Indian veterinarians believe *D immitis* to be confined to north-east India. However, potential vectors, such as *Aedes albopictus* (the Asian tiger mosquito), for *D immitis,* are present throughout India (Megat Abd Rani and others 2010b).

There has been at least one study that has failed to identify *B burgdorferi* sensu lato in India (Handa and others 1999). *A platys* has recently been identified in Indian dogs by PCR at prevalences of 8 to 13 per cent in Mumbai and Delhi but is absent in more temperate climate zones (Megat Abd Rani and others 2011).

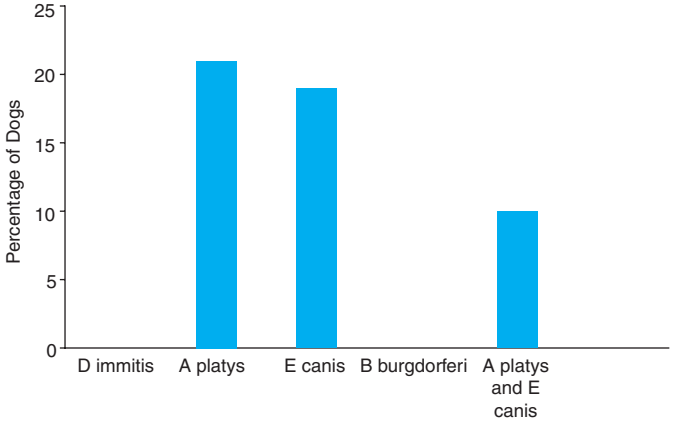

FIG 1: Seroprevalence of Dogs to *Dirofilaria immitis*, *Anaplasma platys*, *Erlichia canis* and *Borrelia burgdorferi* (N=48)

Blood samples from 48 dogs undergoing surgical sterilisation as part of an animal birth control programme at Animal Tracks, a Veterinary Centre run by the International Animal Rescue in North Goa, India, were tested for *D immitis* antigen, *B burgdorferi* sensu lato, *Anaplasma* species and *E canis* antibody using the SNAP 4Dx Test (IDEXX) kit according to the manufacturer's instructions. Biometric data including age, weight, sex and body condition on a five-point scale, and the area from which the dog was captured, were recorded for each animal. A summary of the samples collected is shown in Table 1. Samples were collected over an eight-week period in August and September 2011.

This project was approved by the University of Nottingham, School of Veterinary Medicine and Science, non-ASPA (animals (scientific procedures) act) ethical committee.

Statisical testing of the associations between the biometric parameters and the disease was performed by chi-squared analysis using the Minitab version 15.1.0.1(Mintab) statistical package.

Of the 48 dogs tested, 21 per cent (10) and 19 per cent (nine) tested positive for *A platys* and *E canis*, respectively. Co-infection with these two species was found in 10 per cent (five of 48) of the dogs tested. No cases *of D immitis* or *B burgdorferi* were found (Fig 1). There was a significant association for co-infection with *A platys* and *E canis* ($P<0.005$). No other significant associations were found.

This short communication provides further evidence for the presence of *A platys* in Indian dogs with a seroprevalence of 21 per cent. This is very similar to the recent report by Megat Abd Rani and others (2011) of a PCR-based prevalence of 27.2 per cent for *A platys* in Mumbai, which is only 600 km north of Goa and in a similar climate zone. The prevalence of *E canis* (19 per cent) in this short communication is consistent with the other studies on this pathogen in India, which suggest prevalences from 0.35 to 50 per cent (Juyal and others 1994, Samaradni and others 2003, Lakshmanan and others 2007, Megat Abd Rani and others 2010a, Megat Abd Rani and others 2011).

Co-infection of *A platys* and *E canis* was found in 10 per cent of dogs; this association was statistically significant ($P<0.005$). This would suggest transmission by a common vector, most likely *Rhipicephalus sanguinius*, which is known to be the vector of *E canis* (Nicholson and others 2010), and thought to be the vector of *A platys* (Yabsley and others 2008). *Rhipicephalus* species ticks are also known to form almost 100 per cent of the tick infestations in street dogs in the urban areas of India (Megat Abd Rani and others 2011) with up to 80 per cent of the dogs infested. The study also reported a similar rate of co-infections with *A platys* and *E canis* (4.5 to 7 per cent) in Mumbai and Delhi, respectively. The IDEXX 4Dx kit used in the present study is unable to distinguish between *A platys* and *Anaplasma*

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TABLE 1: Summary of the morphometric data of dogs sampled for this study

Number of animals		Mean (se) body condition score	Mean (se) bodyweight (kg)	% owned
Adults (>2 years)				
Male	13	2.5 (0.1)	12.7 (0.6)	10
Female	9	2.8 (0.2)	14.4 (0.8)	20
Juveniles (≤2 years)				
Male	5	2 (0.0)	11.6 (0.7)	20
Female	21	2.4 (0.1)	12.6 (0.7)	36
Total	48			

phagocytophilum; however, given that Megat Abd Rani and others (2011) identified dogs infected with *A platys* by PCR in a nearby geographical location at a similar prevalence, the seroreaction in the present study is likely to be due to this species and the authors have assumed this throughout this short communication.

No cases of *B burgdorferi* were found in the dogs in this study. This may be a factor of the small number (48) of animals tested; however, there have been other studies in India reporting the absence of this pathogen (Handa and others 1999). Either the test kits are not able to detect Indian strains of this pathogen or it may be genuinely absent from India despite the presence of suitable vectors. Resolution of this question would require direct testing for the pathogen, either by culture or PCR rather than the indirect serological method utilised here.

One false-positive test for *D immitis* was recorded in this study. Microfilaria were observed by light microscopy in thick blood smears from one dog that tested negative for *D immitis* (data not shown); these were assumed to be *Dirofilaria repens* or *Acanthocheilonema reconditum*, species that have been reported in southern India (Ananda and others 2002, Sabu and others 2005, Megat Abd Rani and others 2010b). Crossreactions with *D repens* have been reported in ELISA tests (Schrey and Trautvetter 1998). *D immitis* is thought to be confined to North India (Borthakur and others 2006, Megat Abd Rani and others 2010b). The present study supports this theory.

This study has provided evidence for the presence of *A platys* and *E canis* in community dogs in Goa that will allow local veterinarians to presumptively treat dogs showing clinical signs of erlichiosis or anaplasmosis. The high prevalences of these parasites would indicate a significant risk for tickborne diseases in both the human and dog populations in this area, though the exact vector and pathogen systems involved require further work to be clarified.

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