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, babesiosis 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 10 per cent in Mumbai and Delhi but is absent in more temperate climate zones (Megat Abd Rani and others 2011).

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-ASP A (animals (scientific procedures) act) ethical committee.

Statistical 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 (Minitab) 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).

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 2005, 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 sanguinus, 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.
were assumed to be from one dog that tested negative for Microfilaria were observed by light microscopy in thick blood smears.

The question would require direct testing for the pathogen, either by culture or PCR rather than the indirect serological method utilised here. Resolution of this question would require direct testing for the pathogen, either by culture or PCR rather than the indirect serological method utilised here.

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 Dipetalonema reconditum 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. reconditum 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.

**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 (0.0)                 | 11.6 (0.7) | 20 |
| Female            | 21                            | 2.4 (0.1)                 | 12.6 (0.7) | 36 |
| Total             | 48                            |                           |         |

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