
Study of dirofilariasis in a selected area in the Western Province

RPAS Rajapakshe¹, WSR Perera¹, RL Ihalamulla¹, KH Weerasena¹, S Jayasinghe¹, HBR Sajeewani¹, MG Thammitiyagodage² and ND Karunaweera¹

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Abstract

Introduction Human dirofilariasis is a zoonotic infection caused by the filarial worm, *Dirofilaria (Nochtiella) repens*, whose primary host is the dog. This infection is on the increase over the past decade in Sri Lanka and the prevalence of canine dirofilariasis in the country is also believed to be high. We present here a study on public awareness of dirofilariasis and the prevalence of this infection in dogs in Negombo, an urban area that has a high domestic canine population.

Objective To assess the awareness of dirofilariasis infection among residents and study the prevalence of this infection in domestic dogs in Negombo.

Design Prospective study.

Setting Department of Parasitology, Faculty of Medicine, University of Colombo, Colombo 8, Sri Lanka.

Methods A descriptive cross-sectional study within the city of Negombo during September and November 2003 using a pre-tested, interviewer-administered questionnaire with cluster sampling was done. Two hundred seventy adults, including 132 dog owners, were included in the study. Data analysis was done using the EpiInfo programme.

The prevalence of canine dirofilariasis was studied in a group of 65 dogs over the age of 1 year. They were selected

¹Department of Parasitology, Faculty of Medicine, PO Box 271, Kynsey road, Colombo 8, Sri Lanka; ²Medical Research Institute, Borella, Colombo, Sri Lanka.

Correspondence: NDK, e-mail: <nadira@parasit.cmb.ac.lk>, Tel.: +94112688660, Fax: +94112699284. (Competing interests: none declared). Received 10 September 2004 and accepted 20 November 2004.

by cluster sampling with random choice of the streets within the study area. Stained thick blood films, made following an earlobe-prick at any time during the day, were microscopically examined for the presence of microfilariae.

Results Forty nine of the respondents (18%) were aware of the existence of canine dirofilariasis while human dirofilariasis was known only to 6%. Awareness was related to the level of education. Knowledge of canine filariasis was better among pet owners (32/132) when compared to others (18/138; $p < 0.05$). Veterinary surgeons were acknowledged as the source of information by 38% of those who were aware of the disease.

Forty five per cent ($n = 29$) of the dogs screened were positive for microfilariae. Out of these 18 and two dogs were infected with *D. repens* and *B. ceylonensis*, respectively, while nine others were co-infected with the two parasites.

Conclusions The knowledge of dirofilariasis is extremely poor in the study area. The high prevalence of filarial infections in dogs highlights the importance of improving the public awareness of this disease, especially among the dog owners. Proper management of this condition in dogs—the reservoirs of infection for human dirofilariasis, is important for the control of this zoonotic infection.

Introduction

Dirofilariasis is a zoonotic, mosquito-borne disease caused by the filarial worms *Dirofilaria (Nochtiella) repens* and *D. (Dirofilaria) immitis*, habitual parasites in the subcutaneous tissue or deep viscera of dogs. This infection is accidentally transmitted to humans who are dead-end hosts. In Sri Lanka, the principal vector mosquitoes belong to the genera *Armigeres*, *Aedes* and *Mansonia* [1].

Human dirofilariasis most frequently presents with a localised skin nodule within which a live or a dead parasite may be found. The other common presentation is a visible worm in the subconjunctiva or the periorbital tissue. Sensation of a migrating worm under the skin has also been reported [2]. Its management involves surgical removal of the worm and/or the nodule. Spontaneous recovery has also been reported [2].

In Sri Lanka, the disease was first reported in the year 1962 [3]. Since then there has been a steady increase in the number of cases detected (Table 1). A total of 101 cases had been reported up to 2000 [1]. Further 91 cases have been diagnosed at the Department of Parasitology, Faculty of Medicine, Colombo during the last 3 year–6 month period. With no national database available, the true incidence of the disease is likely to be much higher than what these figures indicate. Sri Lanka is reported to have the second highest number of cases of dirofilariasis in the world after Italy [2].

Dirofilariasis is an established infection in dogs in Sri Lanka. The causative parasite is known to be *D. (Nochtiella) repens* [1, 4, 5] while *D. immitis* has never

Table 1. Reported cases of human dirofilariasis

Time period	No. of cases
1962–1970	6
1971–1980	11
1981–1990	16
1991–2000	95
2001 to date	34
Total	162*

* A total of 187 cases were reported, but 25 did not have the year of presentation and, therefore, not included in the table.

been identified. The only case of *D. immitis* that was reported was in a dog imported from China [4]. Over the last 70 years, only a few studies had been carried out to determine the prevalence of microfilaraemia in Sri Lankan dogs. Studies conducted many decades ago had reported 30–60% prevalence of microfilaraemia in dogs in some parts of the country [4, 6–8].

The present study was designed to assess the level of awareness of this infection among residents in Negombo, which is situated in the most populated province of Sri Lanka, and to determine the prevalence of this infection in pet dogs in this community.

Methods

A descriptive cross-sectional study was carried out using an interviewer-administered questionnaire within the city of Negombo, which is located 30 km north of Colombo, the commercial capital of Sri Lanka. The questionnaire was formulated in English, translated into Sinhala and again translated back to English to minimize inconsistencies. A pre-test was carried out using a pilot sample of 10 individuals and some questions were modified accordingly. The questionnaire was designed to seek data under the following categories:

1. Personal data.
2. Details of pets at home.
3. Knowledge on canine dirofilariasis.
4. Knowledge on human dirofilariasis.
5. Sources of information of the infection.

The knowledge on each section was assessed using several statements in the multiple choice question format.

Streets in the city of Negombo were randomly selected and households located on either side were included in the study after obtaining informed verbal consent. One adult from each household was interviewed. Following the interview, the correct answers to the questions were explained to them. Two hundred seventy completed questionnaires thus obtained were analysed using the EpiInfo programme. In the analysis of data under categories 3 and 4 (knowledge of canine and human dirofilariasis),

correct answers to 50% or more questions were considered as “satisfactory knowledge” on that particular section.

Only dogs older than 1 year were included in the study of canine dirofilariasis, as it takes 6–8 months for microfilaraemia to appear after infective mosquito bites. Sixty five pet dogs in the Negombo city area were included in the study using cluster sampling and random selection of the streets. Verbal informed consent of the animal owners was obtained prior to the inclusion of dogs in the study. Thick blood films were made following an earlobe prick, stained with Delafield’s haematoxylin and examined under the microscope for microfilariae. Approval for this study was obtained from the Ethical Review Committee, University of Colombo.

Results

The demographic data obtained showed that the mean age of the residents studied was 43.9 years (range 16–91 years). Sixty three per cent (n=170) of the sample constituted females. Majority (n = 167) had a level of education between Grade 9 and the General Certificate of Education / Ordinary Level (GCE/OL) while 38 % (n = 103) were educated above this level. Approximately 50% (n = 132) of the sample had pets at home. Out of these individuals, 51 (39%) had dogs and 21 (16%) had cats while the rest owned pet birds. Regular veterinary care was obtained by only a minority (n = 28). Of the 138 respondents who had no pets, 27 % stated that the reason for not having pets was the fear of diseases that could be acquired from pets.

Knowledge on dirofilariasis

Canine dirofilariasis

Only 50 respondents (18.5%) were aware that the filarial worms infect dogs. The level of education appears to be a significant factor, which determines the awareness in the study group, with 32.2% (n = 28) of those who were educated up to the General Certificate of Education/Advanced Level (GCE/AL) and above, being aware of the existence of canine dirofilariasis while only 12% (n = 7) of those who were educated below the level of GCE/OL had any knowledge of it (p < 0.001). Thirty two (24%) of the pet owners were aware of this disease while only 13% (18/138) of those who did own pets knew about it (p < 0.05). A considerable proportion of those who were aware of this disease (19/50) were under the wrong impression that the disease manifests itself as swelling of the limbs in dogs. Twenty seven subjects (10%) stated that drug treatment of dogs would prevent dirofilariasis. Fourteen respondents, however, thought that protecting uninfected dogs from being bitten by infected ones prevents the spread of the disease.

Human dirofilariasis

Only 16 respondents (6.0%) stated that dirofilariasis could be transmitted to humans. This included 12 subjects educated up to GCE/AL and above. Six respondents who had a level of education below GCE/OL were aware of it, demonstrating a significantly low level of awareness (p < 0.01). Thirteen out of 16 who knew of human dirofilariasis were aware that it is transmitted by mosquitoes. Only three individuals demonstrated a “satisfactory” level of knowledge to those questions under this category. Two persons demonstrated a “satisfactory” level of knowledge on the outcome of the disease. Just 10 individuals knew that prevention from mosquito bites could prevent human dirofilariasis. Six respondents showed a “satisfactory” level of awareness regarding prevention. Out of the fifty respondents who knew of the existence of dirofilariasis, 19 (38%) had acquired the knowledge through veterinary surgeons, 16% from printed media and friends / neighbours and 10% from electronic media, while the rest failed to indicate the source of information.

Of the dog population that was screened, 44% (29/65) were positive for microfilaria. Of these, 18 and two dogs were infected with *D. repens* and *B. ceylonensis*, respectively while nine others were co-infected with the two parasites.

Discussion and conclusion

The present study demonstrates the unsatisfactory state of public awareness of both canine and human dirofilariasis. The knowledge is clearly related to the level of education, with a statistically significant difference between those who were educated above and below GCE/OL. This difference may be due to the fact that the well educated people are more health conscious and more receptive to health related information from any source.

The knowledge of pet owners regarding dirofilariasis is significantly greater than those who did not have pets, which indicates that the former may have greater exposure to sources of relevant information. The main source of information identified, was the veterinary surgeon.

These results clearly demonstrate that even though dirofilariasis is a common infection among Sri Lankan dogs with over 40% prevalence in the study area and that human dirofilariasis is on the increase, public awareness on these illnesses is extremely poor.

It is interesting to note that the rate of prevalence, 43.5%, observed in this study is comparable to the findings of the previous studies [4, 6–8]. As the sensitivity of the blood smear detection of microfilariae in dogs is reported to be less than 60% [4], the true incidence of microfilaraemia in these samples probably would be well above the figures obtained.

Being highly populated, this urban area has ample breeding sites for vector mosquitoes such as *Aedes aegypti*,

A. albopictus, *A. togoi*, and *Armigeres subalbatus* [1]. This factor probably contributes to for the high parasitaemia in dogs, which could be considered as a high risk situation for the human population in acquiring the disease.

Two species of microfilariae were detected in the dogs, viz. *D. repens* and *B. ceylonensis*. The latter easily distinguished from *D. repens* by the presence of the sheath and the bluntly ending tail which contains nuclei, in addition to its shorter length of 220–275 µm when compared to that of *D. repens*, which is 268–360 µm. *B. ceylonensis* is a nematode parasite found in cats and dogs and is considered a probable causative agent of zoonosis [9]. The relatively low prevalence of *B. ceylonensis* infection seen in this study may be attributed to the fact that the blood samples were collected during daytime and due to its nocturnal periodicity, chances of missing the parasites in peripheral blood smears are high.

The increased prevalence of filarial infections in dogs and the low level of awareness regarding this infection among local residents as shown in this study, together with the increasing popularity of acquiring dogs as pets in this country highlights the need for improvement of public awareness of the infection, especially among dog owners. Such measures would lead to early detection and proper management of this condition in dogs, which in turn could lead to the reduction of the reservoir of infection for human dirofilariasis.

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