

Brief Report

Human infection by *Dirofilaria repens* in Sri Lanka: A retrospective audit of cases reported by the Department of Parasitology, University of Colombo from 2007 to 2023

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Abstract

Sri Lanka is endemic for human dirofilariasis, a mosquito-borne zoonotic filarial disease. This study is an audit of microscopically confirmed *Dirofilaria repens* cases at the Department of Parasitology, Faculty of Medicine, University of Colombo, from 2007 to 2023. Data collected from patients was descriptively analysed for age, sex, residential district, and anatomical location of lesions. In total, 92 cases were confirmed with *D. repens*. Patients' ages varied from 8 months to 80 years (mean=27.6, n=92). The highest number of patients was in the 0-9 years age category (n=32/92, 34.8%). The majority infected were males (n=49/92, 53.3%). The highest number of samples was submitted from the Colombo district. (n=64/92, 69.6%). Ocular dirofilariasis was reported in 60.9% (n=56/92), with females significantly affected more than males ($\chi^2=8.335, df=1; p=0.004$). Subcutaneous dirofilariasis was reported in 39.1% (n=36/92), significantly more affecting the age category <20 years ($\chi^2=9.808, df=2; p=0.007$). Human dirofilariasis causes morbidity, particularly in children, and should be included in the differential diagnosis of patients with ocular and subcutaneous lesions in Sri Lanka.

Keywords: Human dirofilariasis, *Dirofilaria repens*, Sri Lanka

Introduction

Human dirofilariasis is a mosquito-borne zoonotic parasitic infection caused by the filarial nematodes of the genus *Dirofilaria*. There are several *Dirofilaria* species known to cause human infections, but *Dirofilaria repens* and *D. immitis* are the most commonly reported species in the world.¹ Sri Lanka reports the second highest number of human dirofilariasis cases in Asia.² To

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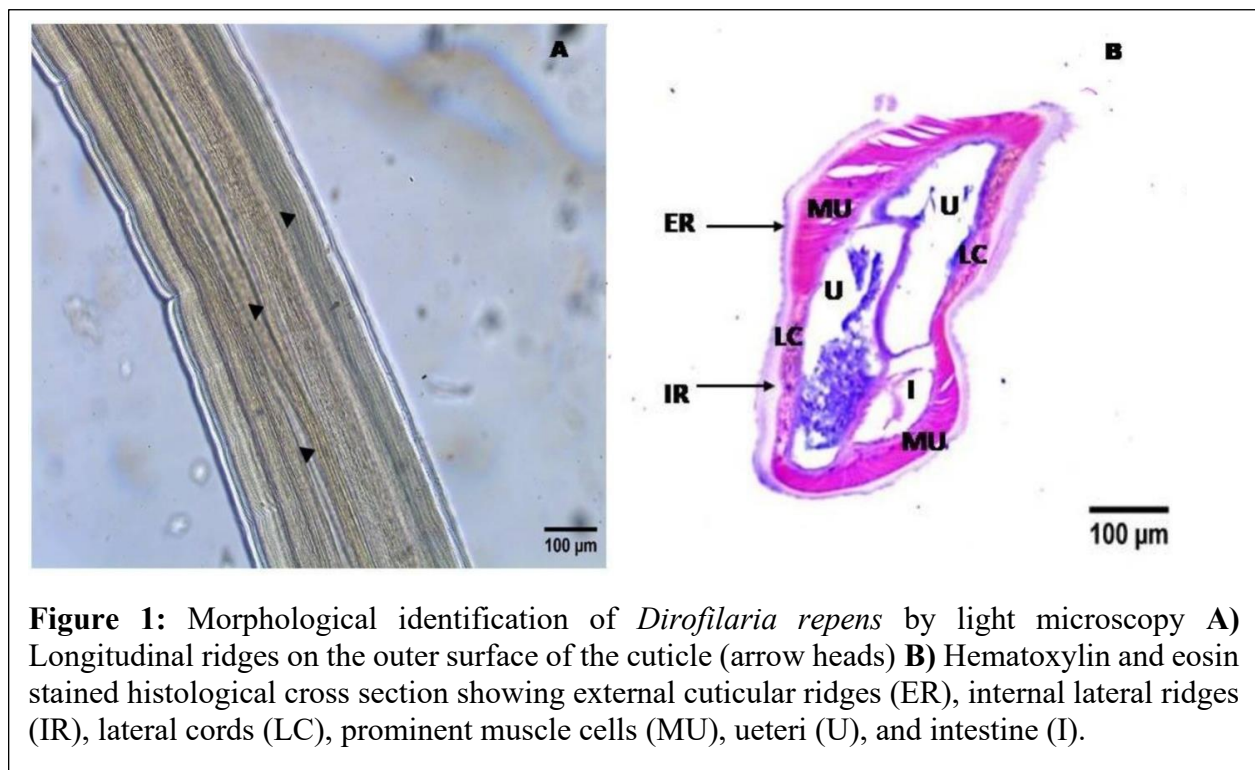
date, *D. repens* is the only *Dirofilaria* species reported to infect humans, dogs, and cats in Sri Lanka, and the overall estimated pooled prevalence is 49.0%.²

Humans are aberrant hosts of *D. repens*, and adult worms are often recovered from subcutaneous, ocular and occasionally from deeper tissues.¹ Surgical extraction of the worm or worm granuloma remains the definitive treatment, while medical treatment is usually not indicated.

The Department of Parasitology, Faculty of Medicine (FoM), University of Colombo (UoC) having one of the oldest parasitology reference laboratories in the country, receives many referrals from patients with dirofilariasis. In this study, we carried out an audit to describe the characteristics of the *D. repens* cases confirmed at FoM, UoC from 2007 to 2023.

Methods

This retrospective descriptive study utilised anonymised secondary data extracted from the records of patients referred to the Department of Parasitology, FoM, UoC from 2007 to 2023. The specimens received for laboratory confirmation included extracted whole nematodes, nematode fragments, or histopathology slides prepared from excision biopsies. *D. repens* was morphologically identified by observation of the evenly spaced longitudinal ridges on the outer surface of the cuticle on wet mounts and/or tall prominent musculature, large lateral cords, and prominent internal lateral ridges in histological cross sections (Figure 1).



Data of patients was descriptively analysed for age, sex, residential district, and anatomical distribution of lesions. A chi-square test of independence was executed to evaluate any significant association between the categorical variables.

Table 1: Descriptive analysis of patient data confirmed with *Dirofilaria repens* infection from 2007-2023

Variable	n (%)
Age Distribution (years)	
0-9	32 (34.8)
10-19	10 (10.9)
20-29	17 (18.5)
30-39	3 (3.3)
40-49	6 (6.5)
50-59	11 (12)
60-69	6 (6.5)
70-79	5 (5.4)
80-89	2 (2.2)
Sex distribution	
Male	49 (53.3)
Female	43 (46.7)
Residential District	
Colombo	64 (69.6)
Gampaha	8 (8.7)
Ratnapura	5 (5.4)
Kalutara	3 (3.3)
Ampara	2 (2.2)
Chilaw	2 (2.2)
Kurunagala	2 (2.2)
Polonnaruwa	2 (2.2)
Badulla	1 (1.1)
Galle	1 (1.1)
Monaragala	1 (1.1)
Vavuniya	1 (1.1)
Anatomical location of the lesion	
Ocular	56 (60.9)
Scrotum	12 (13)
Chest	5 (5.4)
Abdomen	5 (5.4)
Upper limb	4 (4.3)
Lower limb	4 (4.3)
Scalp	2 (2.2)
Back	2 (2.2)
Face	1 (1.1)
Neck	1 (1.1)

Results

A total of 92 case referrals was microscopically confirmed with *D. repens* from 2007 to 2023. The annual number of cases has fluctuated below 10 from 2007 to 2022; however, it showed a surge in 2023 (n=23/92, 25%).

The patients' ages ranged from 8 months to 80 years, with a mean age of 27.6 years (n=92; Table 1). The median age was 20 (IQR 2.3-50.7). A significant number of patients (n=32/92, 34.8%) was aged less than 10 years, while nearly half (n=42/92, 45.7%) were less than 20 years. Males were more commonly affected across different age categories (n=49/92, 53.3%; Table 1). Most samples were received from the Colombo district (n=64/92, 69.6%; Table 1).

However, the patient's complete residential address was not available in the majority of referrals. In more than half of the cases, *D. repens* was extracted from ocular lesions (n=56/92, 60.9%; Table 1). Subcutaneous dirofilariasis was reported only in 39.1% (n=36/92). From those with subcutaneous lesions, the nematode was mostly located in the scrotal tissues (n=12/36, 33.3%).

The Chi-square test of independence revealed a statistically significant association between the location of *D. repens* and the patient's sex. Ocular dirofilariasis was significantly more common in females than in males ($\chi^2=8.335$, df=1; p=0.004).

In addition, a statistically significant association was observed between the anatomical location and age category with subcutaneous lesions occurring significantly more in patients aged less than 20 years ($\chi^2=9.808$, df=2; p=0.007).

Discussion

The Department of Parasitology of FoM, UoC in Sri Lanka has confirmed 92 human dirofilariasis cases from 2007 to 2023. The causative agent in all 92 cases was morphologically identified as *D. repens*. No cases were identified with *D. immitis* or any other *Dirofilaria* species, which is consistent with previous Sri Lankan studies.^{2,3}

Almost 70% of patients were reported from the Colombo district. Easy accessibility of these referrals to FoM, UoC would probably have resulted in this sampling bias. The most affected age group was the children aged 0-9 years (n=32/92, 34.8%), followed by the 10-19 age category (Table 1), which is an observation similar to previous studies.^{4,5} Furthermore, subcutaneous lesions have occurred significantly more in patients less than 20 years. The preponderance of children and young people to acquire dirofilaria infection may be due to minimal clothing in the hot, humid climate in Sri Lanka, exposing them to more mosquito bites than adults.⁴ In this study, males were more frequently affected than females. In contrast, past studies have observed more infections in females than in males.^{4,5} However, this study observes that ocular dirofilariasis occurs significantly more in females than in males, similar to earlier reports, and this association of female sex with ocular dirofilariasis was statistically significant.

Overall, 75.1 % of cases (n= 69/92) had dirofilariasis in the upper part of the body. This is a comparable observation to the previous literature and is explained by the tendency of the parasite to locate near sites of mosquito bites.³⁻⁷ Scrotum was the second most commonly reported tissue, accounting for 13% of all the cases. Out of the 49 male patients, 12 (24.5%) had dirofilariasis in the scrotum. Previous Sri Lankan studies have also observed scrotum as a favoured site by *D. repens*, though the exact reason for this predilection is unknown³⁻⁵

In this study, only the morphological identification of the parasite was done, as molecular confirmation by running Polymerase Chain Reaction with specific primers for *D. repens* was not available in our reference centre. Species confirmation solely based on morphological features could give rise to inaccuracies in diagnosis due to the following two reasons. Firstly, longitudinal cuticular ridges are present in other *Dirofilaria* species (*D. ursi*, *D. tenuis* and *D. striata*), and these species are also found in subcutaneous tissues.⁸ Secondly, the actual morphology could be distorted in histopathological specimens, leading to misidentification.^{9,10} Morphological misidentification of other *Dirofilaria* species as *D. repens* cannot, therefore, be excluded in this study. The lack of more details of the patients, such as the duration of the lesion, the exact location of the parasite in case of ocular dirofilariasis, and pet ownership, was another limitation of this study. The patient's complete residential address was not available in a majority of referrals, compromising the ability to map human dirofilariasis cases, which could have otherwise provided valuable information to guide control and prevention of the disease.

Conclusion

There is a considerable number of human dirofilariasis cases reported from Sri Lanka. Therefore, increasing the awareness about this zoonotic parasitic condition among the healthcare providers, especially those working in the fields of surgery, ophthalmology, paediatrics, radiology, and

histopathology, would be essential to early diagnosis and removal of the adult worm, where appropriate.

Declarations

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Conflict of interest: There are no conflicts of interest.

Ethics statement: As this is a retrospective study of anonymised secondary data collected from the laboratory records, ethical clearance was not sought

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Author contributions:

SS: Writing the manuscript, data analysis

HG: Data acquisition

SD: Data acquisition

TR: Data acquisition

SG: Conceptualisation, reviewing the manuscript

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