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Clinical Profile of Human Dirofilariasis in Kerala: A Retrospective Descriptive Study

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Abstract

Zoonotic dirofilariases are arthropod-borne parasitic infections caused by nematodes of the genus *Dirofilaria*, infecting canines, felines and humans throughout the world. Human dirofilariasis is considered an emerging zoonosis due to the dramatic increase in number of reported cases in the last decade. *Dirofilaria repens* is considered as the most common cause of human dirofilariosis in Kerala. Microfilaremia is absent in humans as the filarial worm fails to complete its life cycle. Human dirofilariasis can present in myriad ways. Usually human dirofilarial infections manifest as subcutaneous or subconjunctival swellings which can be migratory in nature. But *D. repens* can also present as parasitic nodules in various parts of human body including lungs, soft tissues

[including breast], brain, liver, intestine, lymphatic glands and muscles.

This study was done, as a retrospective descriptive study on 45 diagnosed cases of human dirofilariasis between Jan 2014 and Jan 2019 to study the clinical profile and demographic factors of human dirofilariasis in Kerala. In this study 17.78% patients presented as subcutaneous swelling in lower limb, 15.56% as subcutaneous swelling in upper limb, 15.56% as swelling in orbital/periorbital sites, 11.11% as abdominal wall swelling, 11.11% as neck swelling, 8.89% as scalp swelling, 8.89% as breast swelling, 6.66% as parotid swelling and 4.44% as swelling in lung parenchyma. Human dirofilariasis manifested as a solitary lesion in all cases and as migratory lesion in 66.66% cases. All the patients in the study reported the presence of stray dogs in the locality of their houses.

This is a very important observation, because an increase in stray dog population coupled with increased prevalence of dirofilaremia in stray dogs can account for the increased number of cases of human dirofilariasis in Kerala.

Keywords: Dirofilariasis, dirofilariasis repens, zoonosis

Introduction

Human dirofilariasis is an emerging zoonotic infection having a widespread geographical distribution. It is a zoonotic disease caused by infection due to nematodes belonging to genus *dirofilaria*[1]. Eventhough there are nearly forty species of *Dirofilaria*, human infections are caused mainly by *Dirofilaria immitis* and *Dirofilaria repens* [1]. *Dirofilaria immitis* [the dog heartworm] mainly leads to human pulmonary dirofilariasis. *Dirofilaria tenuis* and *D. repens* lead to subcutaneous and ocular dirofilariasis. *Dirofilaria repens* is the most common species responsible for human dirofilariasis in Indian subcontinent [1]. More than 1500 cases of human infection caused by *Dirofilaria repens* have been documented across the world [2]. The majority of cases of human *Dirofilaria repens* subcutaneous and ocular infections are reported from highly prevalent areas where the prevalence in dog population is more than 10 % [3]. These areas include Asia Minor, Central Asia, Srilanka, Southern and Eastern Europe. Compared to *D. immitis*, *D. repens* infection is less severe requiring only surgical excision of subcutaneous nodules [4].

D. repens is the major culprit in Asia. Eventhough infections due to *D. immitis* and *D. tenuis* have been reported from India, by far the most common species responsible for human dirofilariasis in India is *D. repens* [1]. It is commonly found in the subcutaneous tissues of dogs, foxes and cats and is transmitted to humans by zoanthropophilic species of mosquitoes of

the genera *Anopheles*, *Culex* and *Aedes* [1] Worms fail to reach maturity in humans and so microfilaremia is extremely rare. Humans are dead end hosts. *D. repens* presents as parasitic nodules in various parts of human body including eyes, lungs, soft tissues [including breast], brain, liver, intestine, lymphatic glands and muscles [1]. A recently published study by Rangapura K, Pradeep et al , based on the genetic sequence and phylogenetic analysis of CO1 gene, demonstrated that *Dirofilaria* affecting both animals [dogs, jackals] and humans in Kerala are closely related to *Dirofilaria* species *hongkongensis* [5]. This study has pointed to the existence of *Candidatus Dirofilaria hongkongensis* in Kerala causing zoonotic filariasis in humans and canines [5]. This species of *dirofilaria* is a close relative of *D. repens*. Clinical features of *Candidatus Dirofilaria homgkongensis* are similar to that due to *D. repens* [5]. Currently human dirofilariasis is considered an emerging zoonosis due to the dramatic increase in number of reported cases in the last decade [2]. The state of Kerala in India is considered as endemic for dirofilariasis due to the climatic conditions, presence of suitable vectors as well as due to proximity with Sri Lanka, a country with high disease prevalence [6] [7]. Human ocular dirofilariasis was reported for the first time in India in 1976 from Kerala [4]. Out of the 73 cases of human dirofilariasis reported from India since 1976, more than half of the patients were from Kerala [8]. There has been an increase in the number of cases over the last few years and this has prompted us to do a retrospective descriptive study.

Objective

To study the clinical profile and demographic factors of human Dirofilariasis in Kerala.

Methods

A retrospective descriptive study was undertaken on diagnosed cases of human Dirofilariasis, who attended the department of Infectious diseases, Medical College Thiruvananthapuram between Jan 2014 and Jan 2019. Age, sex, site of lesion, co-morbidities and area of residence were ascertained from data registry. Morphological identification of the worm was based on width [maximum], length and appearance of cuticle.

Results and Discussion

Clinical profile			
		No	Percentage
No of cases		45	
Gender	Male	20	44.44
	Female	25	55.56
Age	<10	0	0
	10-20	4	8.89
	20-30	16	35.56
	30-40	14	31.11
	40-50	6	13.33
	>50	5	11.11
Site	Eye	7	15.56
	Breast	4	8.89
	Parotid	3	6.66
	Abdominal wall	5	11.11
	Neck	5	11.11
	Upper limb	7	15.56
	Lower limb	8	17.78
	Scalp	4	8.89
	Lung parenchyma	2	4.44
Solitary lesion		45	100
Multiple lesion		0	0
Migratory lesion		30	66.67
Non Migratory lesion		15	33.33
Mean Absolute eosinophil		400	

count			
Mean Total count	7000		
Mean ESR	30		
Type 2 DM	10	22.22	
Locality	Rural (panchayat area)	25	55.56
	Urban (corporation area)	20	44.44
Pet dogs/cats		5	11.11
Stray dogs in locality		45	100
Ultrasound guided diagnosis prior to confirmation		30	66.67

Discussion

In patients coming from areas endemic for canine dirofilariasis, dirofilariasis should be considered as one of the differential diagnosis of a single migratory or non-migratory cutaneous, sub cutaneous or ocular swelling [3]. Rapid and significant changes in the distribution and disease prevalence of canine reservoirs are being reported from across the world and these changes in turn alter the epidemiological parameters for human dirofilariasis [3]. Seroincidence of dirofilariasis in stray dogs in Kerala was found to be 24.1% in 2018 compared to 7% in 2005 [6]. The explosion in stray dog population over the last decade coupled with increase in seroprevalence of canine dirofilariasis is likely to be the reason for the increase in number of cases of human dirofilariasis observed in Kerala in this decade [3]. Kerala like rest of Indian subcontinent is endemic for mosquito borne diseases like dengue, chikungunya, lymphatic filariasis etc. Tropical humid climate coupled with big strides in industrialisation have created an ideal climate for mosquito breeding [9, 10, 11] [Pampiglione and Rivasi 2000: Sahdev et al 2012, Rani et al 2010]. The abundance of arthropod vectors with increase in stray dog population has contributed to the

increase in number of human dirofilariasis cases over the last decade. The humid climate and recent industrialization have given rise to a conductive atmosphere for the breeding mosquitoes. Hence, it is not surprising that the incidence of Dirofilaria, which shares its arthropod vectors with these, should also rise [9,10,11] (Pampiglione and Rivasi 2000; Sahdev et al. 2012; Rani et al. 2010). Dirofilariasis in India is more common in females with the age range from 1 to 78 years [4]. In reported literature from India, out of 59 cases of dirofilariasis, 34 were females [57.6%] and 25 were males [42.4%] [4]. In our case series out of 45 cases, 25 were females [55.56%] and 20 were males [44.44%]. In reported literature from India, majority of cases belonged to age group 30 to 40 [21%] followed by more than 50 years [20.8%], 40 to 50 [19.35%], 20 to 30 [19.35%], 10 to 20 [14.5%], and less than 10 [4.8%] [5]. In our study majority of cases belonged to age group 20 to 30 [35.56%], followed by 30 to 40 [31.11%], 40 to 50 [13.33%], more than 50 years [11.11%], 10 to 20 [8.89%] and less than 10 years [0 %]. Lack of patients below 10 years of age in our study is probably due to reporting bias as majority of them usually do not get referred for infectious diseases opinion in our setting. In our study all cases presented with a solitary lesion [100%], of which 66.67% of lesions were migratory. In published literature from India, Orbital/periorbital sites accounted for more than half the cases of human dirofilariasis infection [12]. This is followed by subcutaneous areas in head and neck, followed by face, arm and chest in the upper half of the body [2]. In lower half of the body, the preferred locations were the torso, thigh and scrotum. The distribution of dirofilariasis reported from India is similar to that observed by Orihel and Eberhard [13]. In our study 17.78% patients presented as subcutaneous

swelling in lower limb, 15.56% as subcutaneous swelling in upper limb, 15.56% as swelling in orbital/periorbital sites, 11.11% as abdominal wall swelling, 11.11% as neck swelling, 8.89% as scalp swelling, 8.89% as breast swelling, 6.66% as parotid swelling and 4.44% as swelling in lung parenchyma. . A single case of pulmonary Dirofilaria has been reported from India in a child manifesting as portal cavernoma with pulmonary dirofilariasis detected at autopsy by Badhe and Sane [14]. In our study two cases of pulmonary dirofilaria were identified. In our study, sex of the worm was identified as female in 36 out of 45 specimens [80%]. This is in concurrence with reported figures from Indian and world literature Diagnosis and sex of worms was made by morphological examination. Molecular and phylogenetic analyses were not performed. The male worms of *D. repens* ranged from 3.5 cm to 6 cm and female worms ranged from 10 cm to 13.5 cm. In our study 44.44% of patients resided in urban [corporation] areas compared to 55.56% of patients from rural areas [panchayat]. History of exposure to pet dogs/cats was present in 11.11 % of patients. All the patients [100%] reported the presence of stray dogs in the locality of their houses. This is a very important observation, because an increase in stray dog population coupled with increased prevalence of dirofilariasis in stray dogs can account for the increased number of cases of human dirofilariasis in Kerala [14]. Another interesting observation in this study was that even prior to microbiological confirmation, a clue to the diagnosis was given by Radiologists by Ultrasonogram of the affected area in 30 cases [66.66%].

Conclusion

Human dirofilariasis is an emerging zoonosis in Indian subcontinent. In view of increasing incidence, it is

important for all physicians, surgeons, pulmonologists, ophthalmologists, microbiologists, pathologists and radiologists to be aware of this condition. In areas endemic for canine dirofilariasis, a high index of suspicion for human dirofilariasis should be maintained for patients presenting with orbital/periorbital or subcutaneous swelling.

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