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Original Article

Epidemiological Survey of Bovine Thelaziosis in Southeastern of Iran

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Abstract

Background: This study aimed at investigating the prevalence and risk factors of bovine thelaziosis, performed in the southeast of Iran, an endemic area for Iranian Sistani cattle.

Methods: Between September 2012 to October 2014, 1924 cattle, Sistani breed (n= 1235) and Brahman breed (n=689) of all sex and age groups collected from Sistan and Baluchestan Province were examined using visual observation of the eyes by flushing the conjunctival sac and lachrymal duct with sterile saline solution.

Results: The overall prevalence for thelaziosis was 50 of 1924 cows (2. 6%; 95% CI: 1. 9-3. 3%), with significant higher prevalence of infection in Sistani breed than in Brahman breed (3. 15% vs 1. 59%). Sixty adult worms (84. 5% of females and 15. 5% of males) were collected from the conjunctiva of the infected cattle: *Thelazia gulosa* (50/60, 83. 3%) was the most represented species followed by *Thelazia. rhodesi* (10/60, 16. 7%). The number of worms collected per cow ranged from one to seven (average ± standard deviation: 2. 08 ± 1. 49). Worms were gathered from cows throughout all months of the year. The difference in the seasonal variations of prevalence and the intensity of infection were significant, however, no significant correlation between prevalence, sex and age of cattle was noted.

Conclusion: Bovine thelaziosis needs special attention by veterinarians in the differential diagnosis of ocular manifestations and considering its impact on cattle production.

Introduction

Thelazia nematodes (Spirurida, Thelaziidae) which affect the eyes of numerous domestic animals and humans, have a wide geographical distribution throughout the world (1, 2). The adult nematode lives in the eyes and associated tissues, including under the eyelids, nictitating membranes and lacrimal ducts and in the conjunctiva. Transmission of eye worms occurs by means of secretophagous non-biting flies, which feed on animal lachrymal secretions and become infected with the first stage larvae (L1). Larval development takes place in different parts of the vector depending on the *Thelazia* species, and infective stages are present in 18–25 d. Development to the adult stage takes place without migration in the conjunctival sac of the final host within 35 d. Disease caused by *Thelazia* spp. is characterized by mild (e. g., conjunctivitis, epiphora, and ocular discharge) to severe (e. g., keratitis, and corneal ulcers) ocular disease (2). Diagnosis is made by the detection of eggs or first-stage larvae in lacrimal secretions or by finding the adult worms in the conjunctival sac. Due to the localization of the nematode, thelaziosis can be treated topically by direct using of drugs into the eyes, and removal of the adult parasites with fine forceps, using local anesthesia.

Bovine thelaziosis has been studied in Asia, South Africa, Europe and North America, (3-8). In Iran, since the 1951's bovine thelaziosis was represented by only *T. rhodesi* (9). Recently, two more species including *T. gulosa,* and *T. skrjabini* were reported from cattle (10). After this report, an investigation was undertaken to update the overall prevalence of thelaziosis in native cattle in Sistan-Baluhestan Province in the southeastern of Iran.

The objective of current study was to determine the prevalence and intensity of bovine thelaziosis in the study area and to asses, some of the epidemiological risk factors that might contribute for infection.

Materials and Methods

This study was carried in Sistan and Baluchestan Province, located in the southeastern part of Iran. This province lies on the border with both Afghanistan and Pakistan that is located near Lake Hamun and the region is wetted by the Hirmand River.

During Sep 2012 to Oct 2014, seasonal systematic random sampling was carried out and based on previous reports on the prevalence of infection (*P*=2%), the minimum sample size was determined to be 753, although for preventing attrition, more samples (1924) were taken (497 in spring , 515 in summer, 541 in autumn and 371 in winter). Overall, 1924 cattle, Sistani breed (n= 1235) and Brahman breed (n=689) of all sex and age groups were examined using visual observation of the eyes by flushing the conjunctival sac and lachrymal duct with sterile saline solution. Numbers of worms found in each cattle were recorded separately, and the species were determined according to the morphological characteristics (11).

In order to evaluate the role of different risk factors for infection, age, season and sex of inspection of these cows were recorded in a sheet. Association of independent variables (sex, age, season and breed) and infection was evaluated using Chi-Square and Fischer exact test of SPSS software version 16 (Chicago, IL, USA) and (*P*<. 0. 05) was considered as significant.

Results

The overall prevalence for thelaziosis was 50 of 1924 cows (2. 6%; 95% CI: 1. 9-3. 3%), with significant higher prevalence of infection in Sistani breed than in Brahman breed (3. 15% vs. 1. 59%). Sixty adult worms (84. 5% of females and 15. 5% of males) were collected from the conjunctiva of the infected cattle: *T.*

gulosa (50/60, 83. 3%) was the most represented species followed by *T. rhodesi* (10/60, 16. 7%). The number of worms collected per cow ranged from one to seven (average ± standard deviation: 2. 08 ± 1. 49). Worms were gathered from cows throughout all months of the year.

The results of prevalence according to breeds, age groups, gender and season are summarized in Table 1. There was a significant seasonal variation between the prevalence of infection and season, however, no significant correlation between prevalence, intensity of infection, sex and age of cattle was noted.

Table 1: Prevalence and intensity of infection with *Thelazia* spp. in Iranian Sistani and Brahman cattle with respect to sex, season and age

		Sistani breed				Brahman breed			
Variables	**Levels**	**No. of tested animal**	**No. of positive (%)**	**Intensity ±SD**	***P*-value**	**No. of tested animal**	**No. of positive (%)**	**Intensity ±SD**	***P*-value**
Sex									
	Male	875	32 (3. 65)	3±1	0. 12	465	8 (1. 72)	3±1	0. 71
	Female	360	7 (1. 94)	5±2		224	3 (1. 33)	2±1	
Season									
	Spring	314	10 (3. 18)	2±1	<0. 001	183	2 (1. 09)	2±1	<0. 001
	Summer	346	22(6. 35)	5±2		169	8 (4. 73)	3±2	
	Autumn	304	5 (1. 64)	1±1		237	1 (0. 42)	1±1	
	Winter	271	2 (0. 73)	1±1		100	0 (0)	0	
Age (yr)									
	<2	361	18 (4. 98)	5±2 3±1	0. 12	211	6 (2. 84)	3±1	0. 47
	2-3	323	7 (2. 16)			181	2 (1. 1)	1±1	
	3-4	260	6 (2. 3)	2±1		120	1 (0. 83)	2±2	
	>4	294	8 (2. 72)	2±1		177	4 (2. 25)	1±1	
	Total	1235	39 (3. 15)			689	11 (1. 59)		

Discussion

The epidemiology of *Thelazia* spp. is mainly influenced by the presence and seasonality of its vectors and the susceptibility of its definitive hosts. Understanding the epidemiology of infection by *Thelazia* spp. in cattle is a need for reducing the risk of infection, especially by improving their management to avoid exposure to the eye worms.

The present study indicated that besides *T. rhodesi*, *T. gulosa* is very common in cattle in the southeastern of Iran. Accordingly, the infection rate only with *T. rhodesi* was 3. 5% in examined cattle in Iran (9). Result of this study on the presence of *T. gulosa* in native cattle in the southeastern of Iran suggests that this specie has a more extensive geographical distribution than previously thought. We may hypotized that this lack of information on the presence of *T. gulosa* in other regions of country may be due to their sheltered location (12) which probably makes its detection difficult. Moreover, the high frequency of *T. gulosa* infection in this region may account partly by high prevalence of the vector of this nematodes.

T. rhodesi is particularly common in the Old World and have been reported from Japan, USA, Canada, UK, Italy, and Zambia, whereas, *T. gulosa* is mainly distributed in the New World and has been reported in the northern USA , the Canadian Provinces, Asia, Australia and Europe (3, 4,5,7,8,13,15,16). The climate

of the countries in which *T. gulosa* and *T. rhodesi* has been reported varies from tropical and subtropical in the Far East, to temperate in the Russian Federation.

The infection rate in general is lower than what reported from Northwest Ethiopia as 36.83% (15), Zambia 26.6% (13), Philippines 23% (16), Massachusetts 12.2% (5), Canada 9.3% (14), British 41.9% (4) and Italy (7.2% (7). This disagreement might be attributed due to differences in climate conditions, ecological and management systems.

The result of current study revealed that infection rate in <2 yr old both breed is greater than others which were not significant. In contrast, the high prevalence and intensity of infection in cattle more than 2 yr of age and less than 10 have been reported by others (14). High prevalence of *Thelazia* infection of ages less than 2 yr old that is in agreement with Krafsur and Church (6) and Adamu et al. (15) may be due to the likely absence of a protective immunological response.

Our result showed that the prevalence of bovine thelaziosis was not significantly associated with animal sex. Finding non-significant difference in prevalence by sex is in agreement with other investigators (9, 13, 16).

Despite the presence of adult parasites throughout the year, the prevalence in both breed was highest in summer, significantly. "As the first stage larva of *Thelazia* is very short-lived in the lachrymal secretions, only surviving a few hours, and transmission depends upon the continuous presence of the vectors. For this reason, thelaziasis has a seasonal occurrence according to the seasonality of the intermediate hosts" (17). Moreover, the disappearance of adults in eye suggested that there might be a phenomenon occurring similar to the self-cure phenomenon of gastrointestinal *Strongyles* in sheep (4).

Additionally, when the results for Brahman breed were compared with those of Sistani breed, the frequencies of thelaziosis in Sistani breed were higher than Brahman breed, which was significant.

For controlling eye worm infection, molecular epidemiological survey of *Thelazia* spp., in definitive hosts is valuable, particularly as some species can cross-infect the same animals and different species have different susceptibilities to anthelminthic drugs. Moreover, molecular identification of larval eye worms in their vectors will also be useful for studying the epidemiology of *Thelazia*, its prevalence in flies and recognition of the intermediate hosts.

Conclusion

Bovine thelaziosis needs special attention by veterinarians in the differential diagnosis of ocular manifestations and considering its impact on cattle production.

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