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Original Article

Prevalence and Intensity of *Paramphistomum* Spp. In Cattle from South-Eastern Iran

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Abstract

Background: Parasitological investigations on paramphistomosis were carried out over a 12-month period in the southeast of Iran to determine the prevalence and intensity of this disease.

Methods: A total of 1000 cattle, Sistani breed (n= 450) and Brahman breed (n= 550) of all sex and age groups were inspected at random for the presence of paramphistomidae flukes in Zabol slaughterhouse from December 2012 to October 2013.

Results: Paramphistomes were found in 369 of 1000 necropsied cows (36.9%; 95% CI: 30.1-41.9%), with significant higher prevalence of infection in Brahman breed than in Sistani breed (51% vs 19.3%). No significant correlation between prevalence, intensity of infection, sex and age of cattle was noted. Despite the difference in the seasonal variations of prevalence, and the relation between the intensity of infection and season, these were not statistically significant. The mean intensity of infection in Brahman breed was higher (652.66 ± 281.5) than Sistani breed (123.32 ± 32.2). The identification of stained trematodes to the species revealed 40, 20, 20, 15 and 5% *Gastrothylax crumenifer*, *Cotylophoron cotylophorom*, *Paramphistomum cervi*, *Carmyerius spatiosus*, *Explanatum explanatum*, respectively.

Conclusion: The present results will contribute to our understanding of the epidemiology of paramphistomumosis in southeastern Iran.

Introduction

Paramphistomiasis is a neglected parasitic disease of ruminants, which has a wide geographical distribution in subtropical and tropical areas. The adult flukes are generally considered nonpathogenic for their hosts, but migration of immature worms in duodenal mucosa causes severe enteritis, possibly necrosis and hemorrhage and is responsible for anorexia, polydipsia, unthriftiness, severe diarrhea and mortality (1). The prevalence of paramphistomosis is high throughout tropical and subtropical regions, particularly in Africa, Asia, Australia, Eastern Europe, and Russia (1- 4).

In ruminants of Iran, 11 different species of amphistomes were already recorded including: *Paramphistomum cervi, P. gotoi, P. gracile, P. microbothrium, Cotylophoron cotylophorum, Gastrothylax crumenifer, G. compressus, Carmyerius spatiosus, Calicophoron papillosus, Orthocoelium scoliocoeium, Explanatum explanatum* (5- 8). Recently, *Calicophoron calicophorn* has been reported from cattle of the north of Iran (9). Nonetheless, information on the prevalence of cattle amphistomes from areas all over Iran is very limited; despite its significance in veterinary practice (9).

This study aimed to fill such gap carried out in cattle at Zabol in Sistan-Baluhestan Province in southeast of Iran where the main source of Sistani breed production. Therefore, the objective of current study was to determine the prevalence and intensity of cattle amphistomiasis in the study area and to asses some of the epidemiological risk factors that might contribute for infection.

Materials and Methods

This study was conducted in Zabol area in Sistan and Baluchestan Province located in the southeastern part of Iran. This city with an area of 1760 square km lies on the border with both Afghanistan and Pakistan located near Lake Hamun and the region is irrigated by the Hirmand River. The study area receives 20–50 mm of rain/year and has air temperatures ranging between - 8 and +48 ºC.

During December 2012-October 2013, seasonal systematic random sampling was carried out and due to the unavailability of previous reports on the prevalence of infection, the minimum sample size per season was determined as 33, although for preventing attrition, more samples were taken (234 in autumn, 233 in winter, 288 in spring and 245 in summer). Accordingly, the rumen, reticulum and liver of 450 Iranian Sistani cattle and 550 Brahman cattle were examined for paramphistomidae flukes. Numbers of Amphistomes found in each cattle were recorded separately, and 20 were stained using aceto-alum carmine. The species were determined according to the morphological characteristics described by Sey (10).

In order to evaluate the role of different risk factors for infection, sex, age and season 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

Paramphistomes were found in 369 of 1000 necropsied cows (36.9%; 95% CI: 30.1-41.9%), with significant higher prevalence of infection in Brahman breed than in Sistani breed (51% vs 19.3%).

The results of prevalence according to breeds, age groups, gender and season are summarized in Table 1. No significant correlation between prevalence, intensity of infection, sex and age of cattle was noted. Despite the difference in the seasonal variations of preva-

lence, and the relation between the intensity of infection and season, these were not statistically significant. The mean intensity of infection in Brahman breed was higher (652.66 ± 281.5) than Sistani breed (123.32 ± 32.2).

The identification of stained trematodes to the species revealed 40, 20, 20, 15 and 5% *Gastrothylax crumenifer*, *Cotylophoron cotylophorom*, *Paramphistomum cervi*, *Carmyerius spatiosus*, *Explanatum explanatum*, respectively.

Table 1: Prevalence of infection with paramphistomatidae 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	411	82 (19.95%)	202±38	>0.05	401	201 (50.1%)	687±109	>0.05
	Female	39	5 (12.08%)	221±45		149	81 (54.3%)	701±163	
Season									
	Spring	133	25 (18.7%)	201±56	>0.05	155	89 (57.4%)	628±168	>0.05
	Summer	119	20 (16.6%)	231±95		126	69 (54.7%)	731±209	
	Autumn	102	20 (19.6%)	116±24		132	60 (45.4%)	593±89	
	Winter	96	22 (22.9%)	108±16		137	64 (46.7%)	588±78	
Age (yr)									
	<2	86	20 (23.2%)	211±23	>0.05	77	36 (46.7%)	710±123	>0.05
	2-3	135	40 (29.6%)	231±38		181	87 (48%)	731±149	
	3-4	124	18 (14.5%)	221±25		194	122 (62.8%)	803±225	
	>4	105	9 (8.5%)	202±18		98	37 (37.3%)	795±168	
	Total	450	87 (19.3%)			550	282 (51%)		

Discussion

Understanding the epidemiology of infection by paramhistomidae spp. in cattle is a need for reducing the risk of infection, especially by improving their management to avoid exposure to the gastric trematode.

The present study indicated that the overall prevalence of paramphistomidae flukes at Zabol in southeast of Iran was high. Our results is in agreement with previous study which the infection rate with paramphistomidae flukes reported 33.9% in examined cattle in Mazandaran, north of Iran (9). The high prevalence of *Paramphistomum* infection may account partly by no effective treatment non-pathogenic helminth, numerous intermediate hosts and living habitats of Sistani and Brahman cattle. Amphistomiasis has a wide geographical distribution in subtropical and tropical areas, where Sistani and Brahman cattle are widespread in these areas. Moreover, adult *Paramphistome* is very prolific and many eggs are expelled. The infection rate in general is lower than what reported from North-West Ethiopia as 45.83% (11), but higher that than prevalence recorded from Algeria as 12.1% (12), central France 15% (3), northern Portugal and north-west Spain as 12% (2), 18.8% (13); and 7% (14), Pakistan 20.1% (15) and Zimbabwe 25.5% (4). This discrepancy might be attributed due to differences in sample size, diagnostic technique, climate conditions, ecological and management systems. All of species of amphistomes in this study has been recorded previously.

The result of current study revealed that infection rate in 2-3 years old Sistani breed and 3-4 years old Brahman breed is greater than others, which were not significant. Our find-

ing is similar to cattle of north of Iran (9), north-west of Ethiopia (11) and Zimbabwe (4), but in contrast to buffaloes of Pakistan (15) and cattle of Spain (16). Amphistomiasis of cattle is largely a disease of young animals, as successive small infections produce an almost complete immunity (17). Consequently, low prevalence of fluke infection of ages more than 4 years old is attributed to the fact that older animals can develop resistance to re infection.

Our result showed that the prevalence of bovine fluke infections was not significantly associated with animal sex. Finding non-significant difference in prevalence by sex is in accordance with other investigators (9, 15).

The seasonal dynamics of bovine flukes showed that the prevalence in Brahman breed was highest in spring, while in Sistani breed was highest in winter but the difference was not significant. Due to the necessity of the intermediate host in paramphistomosis, influencing epidemiology of the intermediate host, determine epidemiology of the parasite indirectly. Moisture and temperature is considered an important factor in the propagation of infection, because they affect the hatching of fluke ova, viability of encysted metacercaria and the survival and availability of fresh snails.

Furthermore, when the results for Sistani breed were compared with those of Brahman breed, the frequencies of paramphistomes in Brahman breed were higher than Sistani breed. The significant difference between bovine fluke infections and breeds noted that Sisitani breed is known for its tolerance to parasitic diseases. The mean intensity of infection in Sistani breed (123.32 ± 32.2) and Brahman breed (652.66 ± 281.5) was light. To compare our results of intensity with other investigators, 20,000 to 25,000 flukes would result in clinical disease, and smaller number would causes significant subclinical diseases in sheep according to Macarthur (18). The pathogenicity of different species of amphistomes is similar to each other (17). Consequently, mixed infection, which is the rule in Iran, could not produce any complication in the trend of disease production.

Conclusion

Amphistomiasis in Iran, with six million native cattle and 1.5 million mixed and pure breed Holstein (www.ivo.org.ir), is among the most important parasitic diseases of cattle, at least in studied regions. As amphistomiasis is an intermediate dependent parasitic infection, snails are important in the transmission of these amphistomes. However, little interest has been paid on the important intermediate hosts in different regions of Iran. Although, it was found that *Bulinus truncatus* is intermediate host of *P. microbothrium* in Khuzestan (19), no information is available in the literature on the identification snails in southeast of Iran.

In order to control of paramphistomosis in this area of Iran, the type of intermediate hosts involved in the prevalence of fluke infections should clearly be established in the future.

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