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Prevalence of fasciolosis and dicrocoeliosis in slaughtered sheep and goats in Amol Abattoir, Mazandaran, northern Iran

Ali Khanjari[1*], Alireza Bahonar[1], Sepideh Fallah[1], Mahboube Bagheri[1], Abbas Alizadeh[2], Marjan fallah[3], Zahra Khanjari[4]

[1]*Department of Food Hygiene, Faculty of Veterinary Medicine, University of Tehran, P.O. Box 14155-6453, Tehran, Iran*

[2]*Department of Physiology, Faculty of Veterinary Medicine, Islamic Azad University, Science and Research Branch, Tehran, Iran*

[3]*Faculty of Veterinary Medicine, University of Urmia, Urmia, Iran*

[4]*Faculty of Medicine, Sari Branch, Islamic Azad University, Mazandaran, Iran*

PEER REVIEW

Peer reviewer

Hossein Esmaeili, Assistant professor, Department of Microbiology, Faculty of Veterinary Medicine, University of Tehran, Iran.
Tel:00982161117051
Fax: 00982166933322
E-mail: hesmaeli@ut.ac.ir

Comments

This manuscript contains useful information with regard to an important parasitic disease which is responsible for considerable economic losses in developing countries. In my point of view, Authors have been successful to demonstrate the relationship between the prevalence of the liver fluke and the sex/ season/ specie factor.
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ABSTRACT

Objective: The liver flukes, *Fasciola* spp. and *Dicrocoelium dendriticum*, infect ruminants and other mammalian extensively and cause major diseases of livestock that produce considerable economic losses.

Methods: A survey of 2391 sheep and goats slaughtered at an abattoir in Amol region, northern Iran was used to determine the prevalence of the liver flukes infection based on season, sex and specie of the animals.

Results: The results revealed that the prevalence rate of *Fasciola* spp. and *Dicrocoelium dendriticum* was 6.6% and 4.3% respectively. Dicrocoeliosis was more dominant in female animals (7.1%) whereas there was no sex-related difference in the prevalence of *Fasciola* spp. in male and female animals. Furthermore, Fasciolosis was significantly more prevalent than dicrocoeliosis in both sheep and goats. The Seasonal prevalence of *Fasciola* spp. was highest ($P<0.005$) during spring (8.3%) followed in order by autumn (8.1%), winter (5.9%) and summer (4.0%) but Dicrocoeliosis did not follow any seasonal pattern.

Conclusions: According to this study, it can be concluded that Amol is regarded as an endemic region for *Fasciola* spp and D. dandriticum infection. Moreover, *Fasciola* spp. is the most widespread liver fluke found in sheep and goats which is more dominant in sheep than goats.

KEYWORDS
Liver fluke, Dicrocoeliosis, Fasciolosis, Sheep, Goat, Abattoir

1. Introduction

The liver flukes are recognized as one of the most important ruminants helminthic parasites which are found in many parts of the world[1,2]. *Fasciola* spp. and *Dicrocoelium dendriticum(D. dendriticum)* are the common liver flukes in Iran. The principal definitive hosts of these parasites are cattle, sheep and goat. However, certain other mammals, including humans, may be infected as an accidental host[3,4]. Due to the increasing number of

*Corresponding author: Ali Khanjari, Department of Food Hygiene, Faculty of Veterinary Medicine, Tehran University. P.O.Box: 14155-6453, Tehran, Iran.
Tel: +98-21-61117023
Fax: +98-21-66933222
E-mail: khanjari@ut.ac.ir
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human cases, the liver flukes should be considered as an emerging public health concern[5]. On the other hand, they cause major diseases of livestock that produce important economic losses due to mortality, liver condemnation, reduced production of meat, milk, and wool, and expenditures of anthelmintics[6].

Fasciola spp. has an indirect life cycle involving domestic and wild herbivorous mammals and humans as definitive hosts, and freshwater gastropods of the family Lymnaeidae as intermediate hosts[7]. *Fasciola hepatica* (*F. hepatica*) occurs in temperate areas, while *Fasciola gigantica* mainly occurs in tropical zones, but both species overlap in subtropical areas[8]. Temperature, rainfall and soil moisture influence the activity and abundance of the intermediate hosts of *F. hepatica* and *Fasciola gigantica*. Consequently, current climatic conditions can be influential in the development of Fasciolosis[9].

In Iran, fasciolosis is present in many provinces including Kurdistan, Zanjan, Kermanshah, Mazandaran, Tehran, Azerbaijan, Gilan, Fars and Khuzestan[10]. Although the prevalence of fasciolosis among domestic animals is higher in the southern part of the country, the number of reported human disease cases is significantly higher in the Northern provinces situated along the shore of the Caspian Sea[11]. Both *Fasciola* hepatica and *Fasciola* gigantica are endemic in the Northern regions of Iran[10,11,12].

Dicrocoeliasis, a disease of grazing ruminants, is less severe than fasciolosis. While the economic losses, mainly as a result of affected liver condemnation, are considerable[13]. Two intermediate hosts are necessary to complete parasite development: a land snail (*Zebrina* sp., *Helicella* sp., *Cionella* sp.) and an ant (*Formica* sp., *Lasius* sp.). The Final host infection occurs by ingesting the infected ants[14]. Unlike *Fasciola* spp., the intermediate hosts of *D. dendriticum* do not require a moist environment and are widely present in pastures [15].

This study was conducted to estimate the prevalence of the liver flukes infection in sheep and goats slaughtered in Amol abattoir, Mazandaran, Iran, based on season, sex and specie of the animals.

2. Materials and methods

This survey was conducted from September 23, 2010 to September 23, 2011 at an abattoir in Amol region, Mazandaran province, Iran. Amol is located in the middle of the Mazandaran province which is in the north of Iran and has a borderline humid subtropical/Mediterranean climate.

A total number of 2391 sheep and goats, presented to be slaughtered at the abattoir, were randomly sampled during 4 seasons. Specie and sex information were documented before inspection, on the basis of physical appearance of each sample, then the livers were inspected according to the method described by Ogambo-Ongoma (1972) to recognize fasciolosis and dicrocoeliosis[16]. The parasites were identified by their morphological characteristics.

The recorded data, acquired by visualization, palpation and incision of livers, was used to extract the prevalence rate of these parasites. The prevalence rate was sorted seasonally to determine the association of infection rate and seasons. Analysis of data was done, using SPSS software (Version 6.0). Seasonal pattern was investigated with *Chi*-square (χ^2) test and P-value less than 0.05 considered statistically significant.

3. Results

According to the results, among 2391 sheep and goats sampled during the study, 157 (6.6%) and 104 (4.3%) were infected by *Fasciola* spp. and *D. dendriticum* respectively. Dicrocoeliasis was recognized in 7.1% of female animals, whereas only 2% of male animals were infected by *D. dendriticum*. The difference of *D. dendriticum* prevalence in relation to the animals sex was statistically significant ($P<0.005$). However, there was no sex-related difference in the prevalence of *Fasciola* spp. in male and female animals ($P>0.1$). More details are shown in Table 1.

Table 1

Sex-wise prevalence of *Fasciola* spp. and *Dicrocoelium dendriticum* in sheep and goats slaughtered in Amol region abattoir

Liver fluke	Male animals			Female animals			χ^2	P
	Slaughtered No.	Infected No.	Infected %	Slaughtered No.	Infected No.	Infected %		
Fasciola spp.	1287	13	1.0%	1104	144	13.0%	1.403	0.2362
D. dendriticum	1287	26	2.0%	1104	78	7.1%	36.354	0.000

The results revealed that 7.7% and 5.4% of the sheep and goats were infected by *Fasciola* spp. respectively. On the other hand, dicrocoeliasis was recognized in 5.7% of the sheep and 3.0% of the goats. Thus, fasciolosis was significantly more prevalent than dicrocoeliasis in both sheep and goats (Table 2).

Table 2

Prevalence of *Fasciola* spp. and *Dicrocoelium dendriticum* in sheep and goats slaughtered in Amol region abattoir

Liver fluke	Sheep			Goats			χ^2	P
	Slaughtered No.	Infected No.	Infected %	Slaughtered No.	Infected No.	Infected %		
Fasciola spp.	1215	93	7.7%	1176	64	5.4%	4.767	0.0290
D. dendriticum	1215	69	5.7%	1176	35	3.0%	10.493	0.0011

Furthermore, the prevalence of fasciolosis and dicrocoeliasis was evaluated during four seasons of the year and as it is shown in Table 3, the *Fasciola* spp. seasonal prevalence was highest during spring (8.3%) followed in