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Original papers

# Prevalence of hydatid cyst, *Fasciola* spp. and *Dicrocoelium dendriticum* in cattle and sheep slaughtered in Sabzevar abattoir, Iran

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**ABSTRACT**. Hydatid cyst, *Dicrocoelium dendriticum*, and *Fasciola* spp. are common parasites among ruminants. The current study was conducted to assess the prevalence of these parasites in cattle and sheep slaughtered in Sabzevar abattoir, from April 2014 to March 2016. Total of 1653 cattle and 26720 sheep were inspected for helminthic infections of liver and lung in different seasons. The prevalence rates were found to be 684 (2.55%) and 235 (14.21%) in sheep and cattle, respectively. The infection rate of liver in cattle was estimated to be 5.86%, 0.84% and 5.68% for hydatid cysts, *Fasciola* spp. and *D. dendriticum*, respectively and lung infection with hydatid cyst in cattle was 1.81%. Moreover, the liver infection rate of sheep was estimated to be 0.87%, 0.06% and 2.13% with hydatid cysts, *Fasciola* spp. and *D. dendriticum*, respectively and lung infection with hydatid cyst was 0.35%. The rate of infection with *D. dendriticum* was higher in the both animals than the other parasites. The results of this study indicated that the prevalence of the aforementioned parasites was high, which caused high economic losses. Therefore, sanitary and preventive measures should be taken.

**Keywords**: zoonosis, hydatid, liver flukes, Sabzevar, Iran

## Introduction

Zoonotic diseases are responsible for more than 60% of all human infections [1] and are transmitted among animal and human populations [2]. Hydatid cyst has a worldwide distribution [3,4] and is a common disease where people have frequent contact with dogs [5,6]. The majority of human hydatidosis cases were in southern Iran [7]. The larval form of *Echinococcus granulosus* in intermediate hosts is called cystic echinococcosis (CE) or hydatid cyst that can cause economic losses and public health problems [8].

Canids, especially dogs are definite hosts of the adult worm and humans, together with domestic and wild ungulates act as intermediate hosts for the metacestode (larval) stage [9,10].

*Fasciola hepatica* and *Dicrocoelium dendriticum* are responsible for helminthic infection of liver in both humans and animals. The definitive hosts of these parasites are ruminants, however, other mammals including humans may be accidentally infected [10]. A land snail (*Zebrina* spp., *Helicella* spp., *Cionella* spp.) and an ant (*Formica* spp., *Lasius* spp.) as intermediate hosts are required for completion of *Dicrocoelium* life cycle. Definite hosts are infected following ingestion of the infected ants [11]. In addition, freshwater gastropods of the family of Lymnaeidae act as intermediate host for fasciolosis development [12]. Fluke trematodes are located in the bile duct of humans and ruminants leading to health issues in human and economic losses in animals such as reduction in milk and meat production, weight loss, diarrhea, anemia, abdominal pain, cachexia and protein losing syndrome [13,14]. *Fasciola* spp. and *D. dendriticum* are found in many countries in the world [15]. Liver trematodes of sheep are common in the north of Iran and are also endemic in people from Gilan province [16,17]. The prevalence of zoonotic helminths in humans is proportional to animals‘ infection rate [18]. There is scarcity of data on the prevalence of liver flukes and their veterinary and economic importance. Additionally, it is of crucial importance

Table 1. The prevalence of hydatid cyst, *Fasciola* spp. and *D. dendriticum* in cattle and sheep slaughtered in Sabzevar abattoir, Iran

| Type of slaughtered animals | Number of slaughtered animals | Number of infected animals | Liver infection | | Lung infection | |
|---|---|---|---|---|---|---|
| | | | *Dicrocoelium* | *Fasciola* | *Hydatid cyst* | *Hydatid cyst* |
| Sheep | 26720 | 684(2.55%) | 571 (2.13%) | 18 (0.06%) | 233 (0.87%) | 95 (0.35%) |
| Cattle | 1653 | 235(14.21%) | 94 (5.68%) | 14 (0.84%) | 97 (5.86%) | 30 (1.81%) |

to gather epidemiological data before arranging any control programs. Therefore, this study was undertaken to assess the prevalence of some helminth parasites of the liver and lungs among sheep and cattle slaughtered in Sabzevar city based on abattoir data.

## Materials and Methods

Total of 26720 sheep and 1653 cattle were analyzed to determine liver and lung helminthic infections, with hydatid cyst, *Fasciola* spp. and *D. dentriticum*, in Sabzevar abattoir from April 2014 to March 2016 All of the slaughtered animals were carefully inspected and the rate of liver helminthic infection in cattle and sheep was recorded daily. Distomatosis and hydatid cysts were identified in the livers of cattle and sheep according to the previously described procedure [19]. The parasites were characterized using morphological keys [20]. The prevalence rate of these parasites was determined using visualization, palpation, and incision of livers methods. The total prevalence of infection in different seasons was calculated. The obtained data was analyzed using SPSS software (version 21). The seasonal pattern was investigated using the Chi-square test. A *P*-value less than 0.05 was considered statistically significant.

## Results

The overall prevalence rates were determined to be 684 (2.55%) and 235 (14.21%) in sheep and cattle, respectively. The infection rate of liver in cattle was estimated to be 5.86%, 0.84% and 5.68% for hydatid cysts, *Fasciola* spp. and *D. dendriticum*, respectively and lung infection with hydatid cyst in cattle was 1.81%. Moreover, the liver infection rate of sheep was estimated to be 0.87%, 0.06% and 2.13% with hydatid cysts, *Fasciola* spp. and *D. dendriticum*, respectively and lung infection with hydatid cyst was 0.35% (Table 1). The rate of infection with *D. dendriticum* was higher in the both animals than the other parasites. The prevalence of hydatid cyst in the liver and lung was significantly different in both sheep and cattle ($P<0.05$).

Table 2. Seasonal prevalence rate of hydatid cysts, fasciolosis and dicrocoeliosis in cattle and sheep slaughtered in Sabzevar, Iran

| Animal | Parasite | Spring | | Summer | | Autumn | | Winter | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No | infected | No | infected | No | infected | No | infected | No | infected |
| Cattle | *Dicrocoelium* | 413 | 35 (8.47%) | 412 | 26 (6.31) | 449 | 20 (4.45%) | 379 | 13 (3.43%) | 1653 | 94 (5.68%) |
| | *Fasciola* | | 7 (1.69%) | | 3 (0.72%) | | 3 (0.66%) | | 1 (0.26%) | | 14 (0.84%) |
| | *Hydatid cyst* | | 58 (14.04) | | 45 (10.92%) | | 14 (3.11%) | | 10 (2.63%) | | 127 (7.68%) |
| Sheep | *Dicrocoelium* | 6979 | 146 (2.09%) | 6688 | 142 (2.12%) | 6555 | 145 (2.21%) | 6498 | 138 (2.12%) | 26720 | 571 (2.13%) |
| | *Fasciola* | | 6 (0.085%) | | 6 (0.08%) | | 4 (0.06%) | | 2 (0.03) | | 18 (2.5%) |
| | *Hydatid cyst* | | 84 (1.20) | | 76 (1.13%) | | 53 (0.80%) | | 20 (0.3) | | 233 (0.87%) |

Furthermore, there was significant difference in the seasonal pattern for the helminthic infections of cattle and sheep (Table 2). The highest prevalence rate of *Fasciola* spp., *D. dendriticum* and hydatid cyst was observed in the spring.

## Discussion

Liver flukes including *Fasciola* spp. and *Dicrocoelium* spp. are common parasites of ruminants in Iran and numerous reports of large epidemics of human fasciolosis are available [17–21]. Infection of ruminants with liver flukes has also been reported from other countries including Iraq [22], Pakistan [23], Turkey [24] and Nigeria [25]. Moreover, several reports of the ruminants infection exist in some regions of Iran [21,26–30]. The prevalence of fasciolosis has been reported to be 17.8%, 19%, 11.5%, and 34.6% in cattle, sheep, goats, and camels, respectively, in Iran [31]. In the present study, the prevalence of fasciolosis in the slaughtered sheep and cattle were found to be 0.06% and 0.84%, respectively. The low infection rate of liver observed in this study is in agreement with Aminzare et al. [32]. Kordshooli et al. [30] noticed that 11.15% of cattle, 5.22% of sheep, 2.15% of goats were infected with *Fasciola hepatica*, in southern Iran. In an abattoir based study in Amol in Mazandaran province, 7.7% and 5.4% of sheep and goats were found to be infected by *Fasciola* spp., respectively [29]. According to our results, the prevalence of dicrocoeliosis in cattle and sheep was 5.68%, 2.13%, respectively. Moreover, prevalence of dicrocoeliosis was higher than fasciolosis, in both cattle and sheep. Our findings were consistent with those of reported by Mirzaei et al. [32] Aminzare et al. [33] and Gargili et al. [34]. The high occurrence of dicrocoeliosis can be attributed to various factors such as soil type (calcareous or alkaline soils), ecological factors, local environmental and low moisture requirements of intermediate hosts of *Dicrocoelium* [16]. In another study, low prevalence of dicrocoeliosis in comparison of fasciolosis was recorded in Lorestan province [28]. Studies performed in the neighboring countries of Iran have reported different prevalence in ruminants. In Pakistan (district Karak), the infection rate of *F. hepatica* in goats, sheep and cow was 6.6 %, 16 % and 24.2%, respectively [35].

In a study carried out in Turkey, 0.48 and 2.65 % of cattle and 3.99 and 23.55 % of sheep were infected with *F. hepatica* and *D. dendriticum*, respectively [34]. In Saudi Arabia, fasciolosis was 0.04 and 0.00 % in sheep and goats, respectively [36]. Basically, the infection rate of sheep with *Fasciola spp.* in this study was lower than those of Pakistan and Turkey, but higher than that of Saudi Arabia [36].

Hydatidosis is one of the common diseases in animals of Iran and the neighboring countries. The abattoir based studies demonstrate that the average prevalence rates for hydatid cyst is 6.5% [8] and 25.7% [37] in cattle in Iran. In present study, the prevalence rate of hydatid cyst was 5.86% and 0.87% in cattle and sheep, respectively which was lower than the other studies performed in Mazandaran [16], Hamadan [38], Khuzestan [39], Urmia [40], Ahvaz [41], Kohgilouyeh and Boyerahmad provinces [42]. However, it was higher than the studies done by Roostaei et al. [43] and Mohamadzadeh et al. [44]. Studies carried out in the neighboring countries of Iran have recorded different prevalence in cattle. Infection rate of cattle hydatid cyst was 1.84% [45], 0.93% [46], 15.79% [47] 7.6% [48] and 2.76% [49] in Karbala and Al-Najaf Al-Ashraf of Iraq, Pakistan, Turkey and Saudi Arabia, respectively.

According to the studies in Iran, the prevalence of lung infection among different livestock (sheep, goats, and camels) was higher than the liver [50], while in the present study, the liver infection was higher than pulmonary infection. There was a significant relationship between *Fasciola* spp. infection and season in sheep and cattle of the current study. In the both animals the highest infection rate was observed in the spring which was in agreement with other studies [21–30]. The increased prevalence during spring can be attributed to the meteorological data such as high rainfall during spring and also a high prevalence of infection in snails in the rainy season. Our results showed a statistically difference between the seasonal pattern and dicrocoeliosis infection in cattle and sheep.

It can be concluded that liver fluke infection was high in sheep and cattle during spring in the area of the present study. Therefore, a stronger monitoring of ruminants and their treatment are suggested to control the disease. Some treatment strategies with anthelminthic drugs and education of people, treatment of stray dogs are also recommended to reduce hydatid infection.

**Conflicts of interest.** The author do declare that there is no conflict of interest.

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