

PREVALENCE OF LIVER FLUKES INFECTIONS IN SLAUGHTERED ANIMALS IN KASHAN, ISFAHAN PROVINCE, CENTRAL IRAN

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ABSTRACT

Liver fluke are common parasites of herbivores in most of Middle East countries including Iran. The choroic infections of this parasite cause biliary liver cirrhosis in cattle, sheep and goats that leads to huge economic losses. This cross-sectional study was carried out to determine the prevalence of fascioliasis and dicrocoeliosis in Slaughtered animals in Kashan, Isfahan Province central Iran. A total of 267802 liver stock including 9066 cattle, 77912 sheep and 180824 goats and were slaughtered in the 2-year period were examined and overall 31954 (12%) livers were infected. Fascioliasis and dicrocoeliosis were responsible for 4.8% and 5.6% of total liver condemnations in this period, respectively. The infection rate of female sheep was more than males, but in female cattle and goats was lower than males. Data showed significant seasonal pattern for *Dicrocoelium dendriticum* in sheep and goats, but no for *Fasciola* in different animals. Liver condemnations due to fascioliasis and dicrocoeliosis were more prevalent in cattle slaughtered during spring. This survey provides baseline data for the future monitoring of these potentially important parasitic infections in this region.

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KEY WORDS

Prevalence; fascioliasis; dicrocoeliosis; kashan; isfahan Province; Iran

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[1] INTRODUCTION

Ruminant's contamination with parasites can cause reduction of milk production and many disorders such as diarrhea, loss of weight gain, abdominal pain, anemia and cachexia. In some parasitic diseases, liver is an important organ that is infected with parasites [1, 2]. Liver flukes (*Fasciola* sp and *Dicrocoelium dendriticum*) have especially economic importance by mortality, morbidity, and reduced growth rate, condemnation of liver, increased susceptibility to secondary infections and the expense of control measures and public health importance in many countries including Iran [2, 3, 4]. Most of mammals are definitive hosts for these parasites such as sheep, goats and cattle are the most important animals in human environment. Due to complicated detection of these worms, definite recognizing of these parasitic diseases in live animals is performed in slaughterhouses.

The incidence of human fascioliasis has been increasing in 51 countries of the five continents [3, 5, 6]. Recent papers estimate human infection up to 2.4 million, up to 17 million people, or even higher depending on the unknown situations in many countries, mainly of Asia and Africa [5, 7]. Whereas, dicrocoeliosis occasionally affects humans [8, 9]. In Iran human fascioliasis was sporadic until 1987, when an outbreak

occurred in Iran (Gilan Province) and affected more than 10,000 people [10]. The second outbreak occurred 10 years later and several thousand people were infected [10]. Reports of several hundred cases of human disease during interepidemic periods and recent years are present. In Mazandaran Province, fascioliasis has very recently shown to be a major human health problem too [9]. Recently, a minor emergence of fascioliasis, with 17 non-fatal cases, reported in the Kermanshah, western Province of Iran [11]. Human dicrocoeliosis has already been established in Iran (Isfahan Province) by Farid [9], though that is very rare. In the absence of statistically and epidemiologic data, evaluating liver fluke prevalence in livestock based on liver condemnation statistics might be useful. Information about infections of cattle, sheep and goats with liver fluke in south-western Asia were reported from some countries such as Iraq [12], Pakistan (Kashmir) [13], Saudi Arabia [14] and Turkey [15]. An old report has only been published on prevalence of Liver fascioliasis in sheep, cattle, goats and buffaloes from Ahwaz, Iran [16], although several reports exist on those in other regions of Iran [4,17]. Since in central Iran, there are high farms and there was not any data about *Fasciola* and *Dicrocoelium*, this survey was designed to study the presence and distribution of liver flukes in pastured ruminants in Kashan, Isfahan Province during 2007-2009.

[II] MATERIALS AND METHODS

The total numbers of slaughtered animals and liver collection were recorded for cattle, sheep and goats. The weekly visits were made between 20 Apr, 2007 to 20 May, 2009. Liver of 267802 animals including 9066 cattle, 77912 sheep and 180824 goats examined according to the method described by Ogambo-Ongoma [18]. The livers of a total of 666 cattle, 7726 sheep and 23562 goats livers were inspected according to the method described to recognize fascioliasis and dicrocoeliosis. The parasites were identified by morphological characteristics of them [19, 20]. The recorded data, acquired with visualization, palpation and incision of livers, was used to extract the prevalence rate of these parasites. The prevalence rate was sorted monthly to determine the difference between distribution of infection rate and sex, season. Analysis of data was done, using Epi Info software (Version 6.0).

Seasonal pattern was investigated with chi-square (χ^2) test. The P-value less than 0.05 considered statistically significant.

[III] RESULTS

Totally 267802 animals (Cattle 9066, Sheep 77912 and goats 180824) and overall 31954 (12%) livers were condemned.

Fasciolosis and dicrocoeliosis were responsible for 4.8 and 5.6 % of total liver. Among 666 livers of cattle, 2.4 and 2.7 %, of 7726 sheep 6.9 and 7.6 % and of 23562 goats 4.1 and 5 % were positive for *Fasciola* spp and *Dicrocoelium dendriticum*, respectively. There was highly significant difference in liver flukes infection between animals. Infection rate of *Fasciola* spp and *Dicrocoelium* in female cattle, sheep and goats was higher than males and female's sheep and goats were lower than males [Table-1].

There was highly significant difference in *Fasciola* and *Dicrocoelium* infection between cattle, sheep and goats. Infection of cattle was considerably lower than sheep and goats ($p < 0.001$).

Data showed significant seasonal pattern for *Dicrocoelium* in cattle, sheep and goats ($p < 0.001$) and for *Fasciola hepatica* in different animals there were statistically significant differences with respect to season ($p < 0.005$) [Table- 2 and 3].

The highest co-infection was found in goats (2.3%), followed by sheep (1.2%) and no cattle showed co- infection.

Table: 1. Prevalence of *Fasciola* spp and *Dicrocoelium dendriticum* infection in male and female animals slaughtered in Kashan, central Iran, 2007-2009.

Animals	No. of animals examined			No. of animals infected with <i>Fasciola</i> (%)			No. of animals infected with <i>dicrocoelium</i> (%)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Cattle	68	598	666	4(5.9)	12(2)	16(2.4)	4(5.9)	14(2.3)	18(2.7)
Sheep	810	6916	7726	50(6.1)	488(7)	538(6.9)	56(6.9)	530(7.6)	586(7.6)
Goat	2474	21088	23562	108(4.3)	870(4.1)	978(4.1)	186(7.5)	1010(4.8)	1196(5)

Table: 2. Seasonal prevalence of *Fasciola* spp infection in animals slaughtered in Kashan, central Iran, 2007-2009.

Animals	Fasciola spp							
	Spring		Summer		Autumn		Winter	
	Ex	Inf (%)	Ex	Inf (%)	Ex	Inf (%)	Ex	Inf (%)
Cattle	136	6(4.4)	184	4(2.2)	210	2(0.9)	136	4(2.9)
Sheep	1804	214(11.9)	2224	98(4.4)	1518	52(3.4)	2180	174(8)
Goats	5816	364(6.2)	6402	160(2.4)	5796	172(2.9)	5548	282(5)

Ex= No of examined animals

INF= No infected animals

Seasonal pattern was investigated with chi-square (χ^2) test.

Table 3. Seasonal prevalence of Dicrocoelium dendriticum infection in animals slaughtered in Kashan, central Iran, 2007-009.

Animals	Dicrocoelium dendriticum							
	Spring		Summer		Autumn		Winter	
	Ex	Inf (%)	Ex	Inf (%)	Ex	Inf (%)	Ex	Inf (%)
Cattle	136	8(5.9)	184	2(1.1)	210	4(1.9)	136	4(2.9)
Sheep	1804	224(12.4)	2224	132(5.9)	1518	62(4)	2180	168(7.7)
Goats	5816	422(7.2)	6402	236(3.7)	5796	266(4.6)	5548	272(4.9)

Ex= No of examined animals

INF= No infected animals

Seasonal pattern was investigated with chi-square (χ^2) test.

[IV] DISCUSSION

The prevalence rate of liver flukes in herbivores varies considerably throughout the world. Fasciola spp and Dicrocoelium dendriticum are common parasites of ruminants in different parts of Iran [2, 4, 16, 17].

At the end of the 1980s and during the 1990s several large epidemics, including thousands of human fascioliasis, were reported [10, 17] in the northern regions of Iran, where it has an endemic foci. Bandar Anzali city, Gilan Province is an endemic area. In 2000, there was a minor emergence of fasciolosis, in the Kermanshah western province of Iran [11].

In the present survey, fascioliasis and dicrocoeliosis were responsible for 4.8% and 5.6% of Total liver infected, respectively. On the other hand the mean prevalence of Fasciola spp in cattle 2.4%, sheep 6.9% and goats was 4.1% respectively. As such mean prevalence of Dicrocoelium dendriticum in cattle, sheep and goats was 2.7%, 7.6% and 5% respectively [Table-1]. The infection rate in female sheep was more than males, but the infection rate in female cattle and goats was lower than males [Table-1], which was in agreement with the data obtained in our study. Liver condemnation due to Fasciola spp. and dicrocoelium dendriticum in slaughtered cattle during this survey was almost 2.8 and 1.7 folder than those observed in sheep and goats, respectively. The epidemiologic implication of this finding might be attributed at least partly to the sources of their main food. Main food of sheep and goats belonged to plants which are present in mountains and plains, while cattle are mainly feed with herbs close to the sources of water such as

slough, stream, creek, and swampland. It is clear that the plants which are close to water due to higher infection with Fasciola metacercaria might be attributed in more distribution fascioliasis in sheep. In a slaughterhouse survey in ruminants of Tehran, 25.5% of cattle, 31.2 % of sheep and 64.3% of

goats were infected with Fasciola hepatica [21]. The overall prevalence of fascioliasis was lower than previous report in the region by Ahmadi NA et al. [16], that 35.1% of cattle, 22.8%

of sheep and 11.4% of goats. Daryani et al. [4], in a study in Ardabil Province, reported that prevalence of Fasciola spp. in cattle, sheep and goats was 25.9%, 5.3%, and 4.9%; as such prevalence of Dicrocoelium dendriticum in those animals was 10.6%, 6.8%, and 12.4%, respectively. In a slaughterhouse survey of ruminants of Mazandaran Province 4.6% of cattle, 5.7% of sheep and 1.6% of goats were infected with Fasciola spp [17] Other studies were carried out in Iran, reported variable prevalence rates of Fasciola spp. and D. dendriticum in different regions of the country. A study conducted by Daryani et al. reported prevalence rate of fascioliasis in cattle and sheep in Guilan Province which were 25.9 % and 5.3 %, respectively, whereas prevalence rate of dicrocoeliosis in cattle and sheep were respectively 10.6 % and 6.8 % (6), Sahba et al. informed that 82 % and 27.1 % of cattle and sheep livers were infected in Khuzestan province by F. hepatica, respectively [22]. In a study conducted by Movassagh Ghazani and Valilou in the northwest region of Iran, 8.57 % and 20 % of sheep livers were infected by F. hepatica and D. dendriticum, respectively [23]. Saffarbani observed that 20 % and 18.6 % of sheep livers were infected with F. hepatica and D. dendriticum in a slaughterhouse in Ardabil, respectively [24], Eslami. Observed that prevalence rate of F. hepatica in ruminants of Guilan and Mazandaran provinces was 21.5 % and 12 % and this rate for Tehran province was 25.5 % of cattle, 31.2 % of sheep and 64.3 % of goats were infected with F. hepatica [21]. Radfar and Sakha studied prevalence rate of fascioliasis and dicrocoeliosis in sheep which were 1.5 % and 0.22 % in Kerman slaughterhouse [25]. In a study performed in slaughterhouse of Khorram Abad in Lorestan province, 9.5% of sheep and goats were infected with liver trematodes and 1.6% of liver were condemned [26]. Almost 4.1% of sheep slaughtered in Shahr-e Kord were infected with Fasciola hepatica and infection rate in female animals was more than

males [27]. This was in agreement with the data obtained in our study. Ansari-Lari and Moazzeni's study the prevalence rate of fasciolosis in cattle and sheep were 2.91 % and 2.10 %, respectively, whereas the prevalence rate of dicrocoeliosis were 1.00 % and 0.80 % in cattle and sheep in Shiraz, respectively [28]. In a survey of carried out on sheep slaughtered in Kerman, prevalence of *Fasciola hepatica* and *Dicrocoelium* was 1.5 and 0.22%, respectively. Co-infection rate has been reported 0.33% that 0.27% of them showed intense infection to result in total condemnation of liver [25].

Studies carried out in the neighboring countries of Iran have reported different prevalence in different animals. In Pakistan (Kashmir), infection rate of *Fasciola hepatica* in cattle, sheep and goats was 85.1%, 51.3%, and 14.8%, respectively [13]. In Turkey, 3.99% and 23.55% of sheep and 0.48% and 2.65% of cattle were infected with *Fasciola hepatica* and *Dicrocoelium dendriticum*, respectively [15]. Gargili et al. reported that the prevalence rate of fascioliasis and dicrocoeliosis in Turkey, were 3.99 % and 23.55 % in sheep and 0.48 %, 2.65 % in cattle, respectively [15]. In Iraq, an abattoir survey in Basrah revealed that the prevalence for hepatic fasciolosis among cattle, sheep and goats was 0.13%, 0.72%, and 3.30%, respectively [29]. The corresponding figures from Saudi Arabia fascioliasis were 1.20%, 0.04%, and 0.00% in cattle, sheep and goats, respectively [14]. In Brazil, 10.34% of cattle and 20% of buffaloes were infected with liver trematodes [30]. In a survey carried out in 7 provinces of Kenya within a period of 10 years (1990-1999), infection rate of *Fasciola hepatica* in cattle was 0.8% [31]. On the whole, infection with *Fasciola* spp and *Dicrocoelium dendriticum* in ruminants of Kashan was less than different researchers at more different area in Iran, in all species [4, 17]. In comparison to Iran, Pakistan (Kashmir region), a neighboring country, has shown a higher rate in all species [13], but infection with *Fasciola* in livestock of Isfahan Province (Kashan-Iran) was more than that in Saudi Arabia (for all species) and in Turkey (only for cattle) [14,15]. Infection rate caused by fasciolosis in small ruminants (goats) of Iraq [12] was similar to our results. In comparison to Turkey, Iran (Kashan) showed lower rate of dicrocoeliosis in all species. As it shown above, the prevalence rate of fascioliasis is higher than dicrocoeliosis in most studies but the results of this study were different and showed prevalence rate of dicrocoeliosis (1.2%) higher than fascioliasis in cattle, sheep and goats that slaughtered in Kashan slaughterhouse. This high prevalence of dicrocoeliosis can be probably due to more anti helminthes resistance of *Dicrocoelium dendriticum* than *Fasciola* spp. in the country. Data showed significant seasonal pattern for fascioliasis and dicrocoeliosis in cattle, sheep and goats [Tables-2 and -3]. This is close to the results reported from Ardabil by Daryani et al. [4], and Mazandaran by Moghaddam et al. [17]. As it is clear from Tables -2 and -3, liver condemnations due to fascioliasis and dicrocoeliosis were more prevalent in cattle slaughtered during spring (4.4% and 5.9%), sheep (11.9% and 12.4%) and goats (6.2% and 7.2%) respectively. Different weather in different seasons in

Kashan area may be differences in parasitic infection.

[V] CONCLUSION

Liver Infection due to fascioliasis and dicrocoeliosis were more prevalent in cattle slaughtered during spring in sheep and goats respectively. Different weather in different seasons in Kashan area may be differences in parasitic infection

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