

## Epidemiology of Fasciola Hepatica in Iran

Afra Khosravi<sup>1</sup> & Ebrahim Babaahmady<sup>2</sup>

<sup>1</sup> Immunology Department, Ilam University of Medical Sciences, Ilam, Iran

<sup>2</sup> Pathology Department, Faculty of Veterinary, University of Ilam, Ilam, Iran

Correspondence: Afra Khosravi, Immunology Department, Ilam University of Medical Sciences, Ilam, Iran.  
E-mail: afrakhosravi@yahoo.co.uk

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### Abstract

Fascioliasis is a zoonotic disease. Their greatest importance lies in the economic impact. In order to know the current status of this parasite in the province, we decided to carry out the Epidemiology. We used history-necropsy technique for the diagnosis of this parasitosis in infected bovine animals. When we were suspecting to fascioliasis we did a proper history of the area where the animals were sick. A retrospective study was carried out based on the existent registrations of Fascioliasis discoveries in the bovine slaughterhouse of Ilam province during 3 years successively. In the year of (07-08), 8.48% of the sacrificed animals were infested. The year of (08-09) 6.03% and the third years (09-10) 11.09%. In the (2007-2010) we found a high prevalence of Fascioliasis in animals slaughtered in the province, rising more than one third of the total, with significant differences in proportions ( $P < 0.01$ ) among the three years. The findings were also subcapsular hematomas, venous congestion and fibrous peritonitis. The economic losses were considerable.

**Keywords:** fasciola hepática, trematode, fascioliasis, epidemiology

### 1. Introduction

Hepatic Fascioliasis is a parasitic disease that affects the bile ducts of ruminants, pigs, horses, rabbits and other herbivores, as well as men. In addition, parasitic to man and wildlife such as rabbits, kangaroos, elephants and deer. Usually the adult worms are located in bile canaliculi of frequent hosts, but in other cases can be located under the skin or lung, among other locations. This parasite is found in many places of the world, where exists conditions of moisture and temperature for their development (Urquhart et al., 2001). So it is a zoonotic disease and in compared to animal infection, the true prevalence of this disease in humans is still unknown and difficult to diagnose (Urquhart et al., 2001). Depending on the species, some studies have shown differences in resistance or sensitivity to this parasite. It has been described as the pig, boar, dog and cat, mount a rapid response against the parasite by preventing their development. Another is the case of cattle, horses and the man who later react, allowing their proliferation. Finally, sheep, goats and lagomorphs are more receptive to the parasite (Cordero et al., 1999).

The fluke has serious economic losses to the impact on productive animals such as cattle, sheep, goats and buffaloes. It is estimated that there are over 300 million cattle and 250 million sheep are exposed to these parasites in the worldwide. The presence of this parasite in man should not be underestimated (Anon, 1994). The distribution of the disease depends on the presence of an aquatic snail genus whose species are *Limnea* of each area. The construction of dams for irrigation has contributed to its spread, because the surface water has favored the spread of intermediate host snails (Cardozo et al., 1980).

Fascioliasis is a disease that has been described extensively in United States, England, Ireland, the Middle East, Africa and Australia. In most countries the animal's livers parasitized by *Fasciola hepatica* are condemned unfit for human consumption. Recent appointments indicate that it is also an emerging human parasitic disease (Hillyer et al., 1997; Mas-Coma et al., 2007) with about 2.5 million affected worldwide by 2005 (Spithill et al., 1998). In Iran, fascioliasis is also widely distributed throughout the country; there are reports about many years in different articles (Eslami et al., 1998). In order to know the current status of this parasitosis in Ilam, we decided to carry out this work.

## 2. Materials and Methods

For the necropsy we reached a definitive diagnosis of the disease and we could performed in animals dead or sacrificed animals who showed signs of serious illness. A retrospective study was carried out based on the existent registrations of Fascioliasis discoveries in the bovine slaughterhouse of Ilam province in Iran during 3 years successively. In the year of (07-08), the totals of 2734 animals were sacrificed and 232 of the animal's livers were infested with *F. hepatica* (8.48% of the sacrificed animals). Being the year of (08-09) the total of 4059 animals were sacrificed and 245 livers were infested with *F. hepatica* (6.03%), and the one with better results among them. The third years (09-10) the total of 2028 animals were sacrificed and 225 of livers were infested with *F. hepatica* (11.09%). In addition, we studied the animals infected with all species from 1985 to 2004 across the country. Primarily the cows with a total of 54745 animals slaughtered in our country were infested during cited years with (17.7) percent. The difference in disease prevalence between the three years was analyzed with the comparison test of proportions.

## 3. Results

During the period of study we found a high prevalence of Fascioliasis in animals slaughtered in all of the groups, with significant differences in the proportions ( $P < 0.01$ ) between groups (Table 1). Otherwise we calculated de infestation of *Fasciola* between 1985 until 2004 in the country (Table 2). For this reason we decided to determine the prevalence of Fasciolosis at slaughterhouse and increased their rate of infection.

Table 1. Prevalence of Fasciolosis H. and forfeiture of livers

Characteristics	Group 1	Group 2	Group 3	Totals
year	(07-08)	(08-09)	(09-10)	3 samples
Animals Slaughtered	2734	4059	2028	8821
livers condemnation	232	245	225	702
Percent	8.48 <sup>b</sup>	6.03 <sup>a</sup>	11.09 <sup>c</sup>	7.95

Different letters in superscript in the same column differ statistically ( $p < 0.01$ ).

Table 2. Prevalence of Fasciolosis H. in the country (1985-2004)

Species	Total of animals infested	Médium (%)
Sheep	205161	19
Goat	116840	11.5
Cow	54745	17.8
Camel	1027	34.6
Buffalo	250	18.2

The numbers of affected livers seizures corresponds to those reported by the veterinary services post mortem inspection at slaughter, as determined by direct macroscopic observations of adult worms and extent of the injury. It highlights the third group, the proportion increased among slaughter groups.

A comparison of animal's hepatitis in Ilam, with Iran (Table 3). A comparison of the test we used two independent society., considering the significant level of 0.000, which can be concluded that there are significant differences between these two ratios. The value 0.079 can be concluded that animal's hepatitis in the city of Ilam is less than the entire country.

Table 3. A comparison of animal's hepatitis in Ilam, with Iran

Compare proportion Iran and Ilam					
	total	n-Hepatica	Proportion	z	sig
Iran	54745	9689	.177	23	.000
Ilam	8821	702	.079		

Comparison test, we used two dependent societies. The comparison between (07-08), (08-09) and (09-10) we compare the two to two. Given the significant level of 0.000 can be concluded that there are significant differences between these years. The ratio can be concluded that patients in the city of Ilam in year (08-09) are less than (07-08) and (09-10) (Table 4).

Table 4. A comparison of patients with hepatitis Ilam in the years (07-08), (08-09) and (09-10)

Year	total	n-hepatica	Proportion	Compare	sig
(07-08)	2734	232	8.48%	(07-08)and (08-09)	0.000
(08-09)	4059	245	6.03%	(07-08)and (09-10)	0.000
(09-10)	2028	225	11.09%	(08-09)and (09-10)	0.000

#### 4. Discussion

An important factor to consider in the epidemiology of fascioliasis, is related to the main factors in the production of metacercariae:

- Availability of suitable habitat for snails: appropriate conditions of temperature and humidity. These environmental conditions of the shell is preferably in streams and running water, and its appearance will be in the last months of winter and decrease in March and began his hibernation phase (Alcaíno et al., 1989).
- Temperature: mean environmental temperature or above 10° C is necessary both for the reproduction of snails to the development of *F. hepatica*. Both processes are stopped at equal temperatures or below 5°C. This is also the minimum temperature for development and hatching of *F. hepatica* (Morales et al., 2000).

Humidity: The optimum humidity conditions, occur when rainfall exceeds transpiration and reach the saturation levels. This condition is also essential to find miracidia to snails and the dispersal of cercariae released from them. Therefore, it is in spring and summer when environmental conditions are allowing more rapid hatching (Urquhart et al., 2001).

In our country the infection is widely distributed in animal species of interest livestock in all regions, but there are worst affected (Dalimi et al., 2002). In these regions, the developing eggs is stopped in the months of cold, mass hatching and releasing miracidia in the warmer months. In these same months the snails increase their population and therefore a large number of them is attacked by miracidia. As in the spiral cycle delay of five to six weeks, it frees up a lot of cercariae between the months of adequate temperarura (spring) and encyst in these pastures (as metacercariae) infecting large numbers. Therefore, the animals begin to eliminate eggs through their feces in the end of spring. In autumn and winter there are no new infestations of pastures, but the untreated animals presented in their liver flukes acquired in years or months, those who continue (Mobedi et al., 1994). For example, the prevalence of fascioliasis in the period 1985 - 2004 was 17.8% in cattle, 19% in sheep, goats 11.5%, 34.6% in camels (Dalimi et al., 2002). Considering that the approximate weight of beef liver is 6 kg, 2 kg of goat and of sheep 2 kg. you can set it in a year confiscated tons of livers is almost difficult to evaluate the losses generated by decreasing the production parameters, in addition to costs generated fasciocide shopping expenses and veterinary care.

These figures show that although efficient drugs available to treat affected animals, this zoonosis has not diminished compared to control strategies based exclusively on pharmacological treatments (Morales et al., 2000).

You should add to the above other losses at the production level, whether milk, meat and hair or wool, depending on the species affected (Ferre et al., 1994). For example, it has been experimentally infected the sheep and decrease their daily food consumption by about 50% at 9 to 12 weeks post infection. Other authors have reported an average consumption less than 15% at 20 weeks post infection, compared with a control group (Ferre et al., 1994; Johnstone, 1998).

Fascioliasis has different styles, associated with the amount and frequency of ingestion of metacercariae by the host (Cordero et al., 1999). However, there are also differences depending on the infectivity of the parasites, dependent on environmental conditions that have supported its development in the snail and encyst on plants (Cordero et al., 1999). These results are consistent with those obtained in other studies conducted in Cuba in other periods (Mitterpak et al., 1999). On the contrary, when compared with research in other countries, we observe that slightly are lower than the indicator between 42 and 68.7% (Lea Master et al., 1995). The

Fascioliasis disease has a wide distribution with a high prevalence in Brazil and reached 87.45% in cattle fields and wild animals (Barrera, 2004). We also found a high number of liver condemnations, which reflects the degree of impairment of this organ.

However, in countries such as Morocco and Mexico also have high reported seizures between 45 and 55% (Moukrim et al., 1992). The annual behavior of the prevalence of parasitism was very variable for years in the province of Ilam. In the years of studied, the economic losses only by way of liver condemnation rate were high. Given that the average weight of each liver was 3.6 kg and the average value in the global market has been in recent years close to \$ 10.00 per kg, said losses in the three years studied amounted to an approximate value high. In cattle, production losses Fasciolosis normally go unnoticed, because the course of the disease is slow. Fascioliasis influences milk production and can be affected by up to 30%. It also brings growth retardation and poor feed conversion losses being in this sense between 30 and 50%, weight loss, economic loss by forfeiture of livers at slaughter, as well as reproductive disorders and may be added as well as synergistic effects costs incurred for the control of both the intermediate host and the parasite, and public health problems in humans (Mauri 1999; Quijada et al., 2009).

By the necropsy we will reach a definitive diagnosis of the disease. We recently performed in animals dead or sacrificed the animal, showing signs of serious illness.

We treated acute fasciolosis, and observing bleeding in the liver parenchyma, produced by the migration of immature parasites during the first 8 weeks post-infestation, a large swelling of the liver, with routes in the parenchyma with coagulated blood, as well as subcapsular hematomas, venous congestion and fibrous peritonitis. When cutting the liver into slices of 1 cm can be found in the parenchyma, large number of young forms of the *F. hepatica*. All of them coincide with (Eslami et al., 1998).

So we are faced with chronic fascioliasis symptoms and the number of parasites. It manifests with cholangitis, hepatic fibrosis, enlarged lymph nodes and cutting the bile ducts we are seen enlarged and calcareous deposits (in cattle) in the presence of adult parasites. This method has proven useful for epidemiological studies and to identify problem areas in (Cardozo, 1980; Johnstone, 1971).

Today in Iran there are little and distributed scientific informations to prevent transmission of Fasciolosis in living animals. The significant differences in the groups studied should, probably, to differences in health management. The ecological conditions of each region, intensive grazing systems or extensive, mixed grazing cattle and sheep; determine the epidemiology of the disease for each region. All the factors that influence the life cycle of the parasite and its transmission must be studied in each case to establish reasonable measures to prevent and control disease (Chick et al., 1980; Chirinos et al., 1991).

Recent appointments indicate that it is also an emerging human parasitic disease, with about 2.5 million affected worldwide by 2009.

## 5. Conclusions

In all three groups studied, there was a moderate incidence of parasitic diseases caused by *F. hepatica* with most problems in group three, there is variability among the years studied. Seizures of livers were also high, resulting in economic losses.

The diagnosis of *F. hepatica* is not only a sufficient reason for a global fight against the parasite. The decision will have to be related to the economic impact on each particular operating system.

## Recommendation

According to the results, the presence of persistent Fasciolosis, therefore human health authorities and animal, must design a control program in these rural areas that are so close to urban areas with high-risk population.

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