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A slaughterhouse study on prevalence of some helminths of cattle in Lorestan provience, west Iran

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PEER REVIEW

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Comments

This is a good study where authors have studied the prevalence of some helminthic infections in cattle. This will help in planning to control of disease in this area and in the world.
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ABSTRACT

Objective: To investigate and provide data on the prevalence, epidemiological pattern zoonotic impact of helminth parasites in cattle slaughtered at abattoir in Khorramabad, Lorestan province, southwestern Iran from April 2010 to April 2013.

Methods: A total of 150 869 livers of cattle were examined. The total prevalence rate of distomatosis and hydaditidosis in different seasons were calculated.

Results: The overall prevalence rate of infection was 23.3%. The prevalence rate of hydatid cyst (9.4%) infection was significantly higher than the prevalence of fasciolosis (7.6%) and dicrocoeliosis (6.3%) ($P<0.001$). Data showed significant seasonal pattern for three parasitic infections ($P<0.001$). The highest prevalence rate of *Fasciola* spp. and *D. dendriticum* infection were seen in spring, while the highest rate of hydatidosis was seen in winter. The highest and lowest of overall infection were recorded during winter 2012 and autumn 2011, respectively.

Conclusions: According to this study, it can be concluded that Khorramabad as an endemic region for distomatosis and hydatidosis infection. More surveys are suggested to be carried out to collect more data about the internal organs infection prevalence and risk factors for developing a prediction model in ruminants in southwestern Iran.

KEYWORDS

Hydatid cysts, *Fasciola* spp., *Dicrocoeilium dendriticum*, Cattle, Lorestan

1. Introduction

Globally parasitic diseases continue to be a major constraint for poor developing countries. They are rarely associated with high mortality and their effects are usually characterized by lower outputs of animal products, by-products, manure and traction all contributing to assure food security. The economic impact of parasites in cattle encompasses mortality and mobility losses (measured in terms of less than optimum production of meat, milk), enhanced susceptibility to bacterial and viral diseases, and losses resulting from condemnation of carcasses and, as organs well as cost of drugs and veterinary care[1]. Dominant parasites in cattle can change due to management practices and deworming.

Domestic intermediate hosts are a major reservoir for the disease in humans[2,3]. Transmission to humans is favored by the fact that most individuals living in affected areas

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do not understand the relationship between human and animal disease and do not appreciate the risk linked to the consumption of raw vegetables and their derivatives[4,5].

One of the important parasitic diseases in cattle is hydatid cyst[2,6]. Cystic echinococcosis (CE) is a disease which causes considerable economic loses and public health problem[7]. Hydatid cyst is the larval form of *Echinococcus granulosus* in intermediate hosts[2]. CE or hydatidosis of livestock animals causes decreasing in production of meat, wool, and milk and thereby high economical loses. Furthermore, the infected organs of the slaughtered animals are being condemned[8]. Several slaughtered based studies report from 1% to 70% of animal infection to hydatidosis[9-11].

Other common helminth parasitic diseases of humans and animals are liver trematodes named *Fasciola hepatica* (*F. hepatica*) and *Dicrocoelium dendriticum* (*D. dendriticum*). They live in the bile duct of humans and ruminants and infection in human led to health issues in society and in cattle causes enormous economic losses[12,13]. The parasites considered as an important source of losing protein in animals[14]. The prevalence rate of fasciolosis and dicrocoeliosis are changed from 2.4%-82% for *F. hepatica* and 2.5%-15.6% for *D. dendriticum*.

Since in Southwestern Iran there is a high concentration of pastured livestock on traditional farms and there was no enough epidemiological data about helmintic infections in cattle in this area, this study was conducted to estimate the prevalence of liver helmintic infections (distomatosis and hydatid cyst) in abattoir populations of cattle in Khorramabad, Lorestan province for the period 2010-2013.

2. Materials and methods

This retrospective study was conducted from April 2010 to April 2013 in the Khorramabad, Lorestan province, west of Iran which is located between the latitudes 32°30′ and 48°1′N and longitudes 55°17′ and 61°15′E. Long-term annual mean precipitation is 580 mm, altitude 1 125 m above the sea level and long-term mean annual temperature is 17.07 °C. Lorestan province has a variation in the weather and climate (a range from warm to cold climates). This province is classified as a region with a semi-arid climatic condition. The total area of the province is 28 064 km^2 and the total cultivated area of barley is about 138 978 ha consisting of 9 029 ha of irrigated and 129 949 ha dry land barley[15].

Every slaughtered animal was carefully examined and the rate of liver helmintic infection in cattle was recorded daily on prepared sheets. The livers of total 150 869 cattle were inspected according to the method described to recognize distomatosis and hydatid csts[16]. The recorded data, acquired with visualization, palpation and incision of livers, was used to extract the prevalence rate of these parasites. Total prevalence of infection at different seasons were calculated.

Analysis of data was using SPSS version 16 software. Seasonal pattern was investigated with *Chi*-square test. The *P* value less than 0.05 was considered statistically.

3. Results

During the study years a total 150 869 carcasses of cattle were examined. The overll prevlence rate of infection was 23.3% which of this amount 9.4%, 7.6% and 6.3% were related to hydatid cyst, fasciolosis and dicrocoeliosis, respectively (Table 1). There was highly significant difference between distribution of infection and year ($P<0.001$). The highest rate of hydatid cyst (10.3%) and fasciolosis (8.8%) were seen in 2010 and the highest prevlence of dicrocoeliosis (9.1%) was seen in 2012 (Table 1).

Data showed significant seasonal pattern for helminitic infections in cattel study (Table 1). The highest and lowest of overall infection were recorded during winter 2012 and autumn 2011, respectively. The higest prevalence rate of *Fascilola* spp. and *D. dendriticum* infection were seen in spring, while the highest rate of hydatidosis infection was seen in winter.

Table 1

Seasonal prevalence rate of hydatid cysts, fasciolosis and dicrocoeliosis in cattle slaughtered in Lorestan, Iran.

Year	Parasites	Spring		Summer		Autumn		Winter		Total	
		No.	Infected (%)	No.	Infected (%)	No.	Infected (%)	No.	Infected (%)	No.	Infected (%)
2010	Hydatid cyst		1241 (11.5)		1136 (9.6)		1139 (11)		928 (9.1)		4444 (10.3)
	Fasciolosis	10 823	1151 (10.6)	11 829	1013 (8.6)	10 350	889 (8.6)	10 201	770 (7.5)	43 203	3823 (8.8)
	Dicrocoeliosis		924 (8.7)		736 (6.2)		657 (6.3)		363 (3.6)		2698 (6.2)
2011	Hydatid cyst		928 (8.3)		1147 (8.3)		1132 (7.9)		1519 (9.6)		4726 (8.5)
	Fasciolosis	11 246	739 (6.6)	13 861	756 (5.5)	14 302	724 (5.1)	15 878	978 (6.2)	55 287	3197 (5.8)
	Dicrocoeliosis		405 (3.6)		433 (3.1)		409 (2.9)		724 (4.6)		1971 (3.6)
2012	Hydatid cyst		1329 (9.5)		1544 (8.6)		1099 (9.4)		1000 (11.5)		4972 (9.5)
	Fasciolosis	14 061	1081 (7.7)	17 967	1368 (7.6)	11 658	1021 (8.8)	8 693	1012 (11.6)	40 684	4482 (8.6)
	Dicrocoeliosis		1034 (7.4)		1497 (8.3)		1210 (10.4)		1028 (11.8)		4769 (9.1)
Total	Hydatid cyst		3498 (9.7)		3827 (8.8)		3370 (9.3)		3447 (9.9)		14142 (9.4)
	Fasciolosis	36 130	2971 (8.2)	43 657	3137 (7.2)	36 310	2634 (7.3)	34 772	2760 (7.9)	150 869	11502 (7.6)
	Dicrocoeliosis		2381 (6.6)		2666 (6.1)		2276 (6.3)		2115 (6.1)		9438 (6.3)

No.: Number of cattle examined; Infected: infected animals.

4. Discussion

Helmintic infections cause considerable economic loss in livestock due to condemnation of organs and reduction of milk and meat production. Therefore, it is justifiable to find reliable data for monitoring epidemiologic aspects of the disease and prepare a baseline data for future comparison. Inspection records of the slaughtered animals have been used as useful source for evaluation of the epidemiological aspect of certain disease in several countries[2]. Although abattoir surveys have limitations, they are an economical way of gathering information on livestock disease. It is suggested that an efficient meat inspection service should function as an important monitor of animal disease, being particularly valuable in the field of chronic and ill-defined conditions which are not apparent to either the stockowner or his veterinary surgeon but must be of considerable economic and animal health significance[17]. Also, a feedback from the slaughterhouse to the individual farm is of great value in the field of preventive medicine.

The data revaled in this article give valuable information considering the prevalence of hydatid cyst, *F. hepatica* and *D. dendriticum* in slaughtered cattle in Khorramabad, Lorestan province, Iran. Hydatidosis is a common disease in some animals in Iran and also in neighbouring countries. In early studies done in other parts of Iran on cattle slaughterhouse surveys demonstrated that average prevalence rates for hydatid cyst were 6.5%[2] and 25.7%[8]. In present study, the prevalence rate of hydatid cyst was 9.4%, which are low rate when it was compared to other studies that done in Mazandaran[3], Aleshtar[18], Ardabil[19], Sarab[20], Khozestan[21], and Urmia[22]. Studies carried out in the neighbouring countries of Iran have reported different prevalence in cattle. Infection rate of cattle hydatid cyst in Bagdad, Kirkuk, Mosul, Turkey, Lahore, India, and Saudi Arabia were 4.3%[23], 6.3%[24], 0.55%[25], 7.6%[26], 6.43%[27], 29.65%[28] and 3.63%[29], respectively.

The differences in prevalence of hydatid cyst may arise due to differences in environmental condition that are conductive to the prepetuation of the parasite, abundance of infected definitive host, livestock husbandry, stocking rate, nature of the prature and grazing patterns of animals. Importantly, hydatid cyst is a potential threat to humans in Iran. Because of presence of large stary dog population in the country and improper disposal of abattoir condemend organs, there is a big possibility of the disease to affect a higher human population. It is clear therefore that the abattoir hydatid cyst records in domestic ruminants in the region gives more evidence of possible higher rates of the disease in humans.

Data showed significant seasonal pattern for hydatid cyst in the cattle ($P<0.001$). The highest rate of this infection was seen in spring 2010 and winter 2011. In a recent study, the heaviest infections were recorded in summer and autumn, while no infection was found in autumn and winter[25]. In other study, the highest prevalence of hydatid cyst was seen in summer and followed by autumn[24]. However, this case is highly related to the chance of cattle to contact with the final host acquiring the metacestode regardless time and place proposed.

The liver flukes are recognized as one of the most important ruminants helminthic parasites which are found in many parts of the world[30]. *Fasciola* spp. and *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[31].

In our study, the prevalence rates of *F. hepatica* and *D. dendriticum* were 7.6% and 6.3%, respectively. In a slaughterhouse survy in ruminants of Tehran, 25.5% of cattle was infected with *F. hepatica*[32]. The overall prevalence of fasciolosis was lower than previous report[33] which 35.1% of cattle was infected. The prevalence rate of fasciolosis in cattle in Ardabil[34], Mazandaran[35], Ilam[36], Gilan[37], Khozestan[38], and Shiraz[39] were recorded 25.9%, 4.6%, 53%, 32%, 4.5%, and 2.91%, respectively. The prevalence rate for this trematode in neighbouring countries were also compared to our study results. This prevalence in Iraq (Kerbala)[40], Pakistan (Kashmir)[41], Turkey[26], and Saudi Arabia (Taif)[42] have been reported 1.32%, 19.3%, 4.42%, and 8.6%, respectively.

The prevalence of *Fasciola* spp. showed significant seasonal differences in this study. The hatching of fluke eggs and the multiplication of the snail intermediate host require high rainfall and temperatures (>10 °C)[43]. These conditions generally occur in the spring and autumn, when many fluke eggs hatch, snails multiply and then cercariae develop and are released on wet pastures before encysting onto herbage. The seasonality pattern in fasciolosis prevalence has been also observed by other investigators[44-46].

Dicrocoeliosis is believed to be endemic or potentially endemic in 30 countries and occurs in both pasture-bred and wildlife species throughout the world. The disease is common in those regions of Europe, the Middle East, Asia, North Africa and in North and South America and Australia, where the local conditions are favorable for certain species of earth snails and ants as intermediate hosts[47]. In Iran, dicrocoeliosis occurs in the regions with pasture breeding of ruminants and its prevalence does not exceed 25%[33,34]. Some studies which were carried out in Iran in the last decade, indicating variable prevalence rates of *D. dendriticum* in different regions of country. The range of prevalence is from 0.22% to 20%. In two studies in Ardabil province and Khuzestan province, cattle *D. dendriticum* were reported 10.6% and 0.95%, respectively[33,34]. In other study in Northeast of Iran, the infection rate of *D. dendriticum* was reported 11.3%[48]. In a study conducted in Kashan, central part of Iran, 2.7% of cattle was infected with *D. dendriticum*[45]. The rate of dicrocoeliosis in cattle has been reporetd 1% in shiraz[39].

However Iran is considered as an endemic region for *D. dendreiticum*, but during last 10 years due to successful anthelminthics program of veterinary organization, the prevalence rate of *Dicrocoelium* has dropped considerably. The prevalence rates for this trematode in neighboring countries were compared to our results indicating that the rates were lower in our study. The infection rates of *D. dendriticum* in livestock in Turkey was changing from 3.0%-55.6%[26]. The rate of infection with *D. dendriticum* is recorded 14.7% of cattle in India[49].

There are two important features that differentiate the epidemiology of *D. dendriticum* from that of *Fasciola* spp. Firstly, unlike *Fasciola* spp., the intermediate hosts of *Dicrocoelium* do not require a moist environment and are widely present in pastures and secondly, the fluke eggs can survive for months on these pastures[43]. Seasonality of

this infection is favored by movement of the animals from lowland to mountain pastures where they become infected by the ants and then bring the infection back to the valley during the winter[50]. However, significant correlation between *D. dendriticum* prevalence and seasons was detected in this study that this pattern has been observed in other studies[44,45].

This abattoir survey generally reflected the disease situation in the Khorramabad region. According to this study, it can be concluded that Khorramabad is regarded as an endemic region for *Fasciola* spp. and *D. dandriticum* infection. More surveys are suggested to be carried out to collect more data about the internal organs infection prevalence and risk factors for developing a prediction model in ruminants in southwestern Iran. The identified risk factors and the prediction model can be useful to formulate appropriate control strategies and decrease the economic loss due to condemnation of infected livers.

Conflict of interest statement

We declare that we have no conflict of interest.

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Comments

Background

Globally parasitic diseases continue to be a major constraint for poor developing countries. They are rarely associated with high mortality and their effects are usually characterized by lower outputs of animal products, by-products, manure and traction all contributing to assure food security.

Research frontiers

This study aims to investigate and provide data on the prevalence, epidemiological pattern zoonotic impact of helminth parasites in cattle slaughtered at abattoir in Khorramabad, Lorestan province, Southwestern Iran from April 2010 to April 2013.

Related reports

Some studies related to this report have been done by several other researchers in various countries, but to my knowledge this study is the first survey that conducted in this area that studied hydatidosis and distomatosis simultaneously.

Innovations & breakthroughs

In this study, the prevalence rate of fasciolasis, dicrocoeliasis and hydatidosis was determined in cattle. Results of this study give very good indication about the prevalence of these helminthic infections in this animal in this region.

Applications

Results can provide critical guidelines for initiating control strategies for policy makers to monitor and control the helminthic disease in cattle.

Peer review

This is a good study where authors have studied the prevalence of some helminthic infections in cattle. This will help in planning to control of disease in this area and in the world.

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