

Original Article

The Prevalence of Fascioliasis in Slaughtered Animals of the Industrial Slaughterhouse of Arak, Iran (2007-2010)

Mehran Sayadi¹ Mohammad Rezaei¹ Mahdi Jahanbakhsh¹ Mostafa Gholamrezaei² *Issa Mohammadpourfard¹
Mohammad Yahyaei³ Reyhaneh Esmaeili⁴

- 1- Department of Food Safety and Hygiene, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran
2- Department of Parasitology and Mycology, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran
3- Department of Life Science Engineering, School of New Sciences and Technologies, University of Tehran, Tehran, Iran
4- Department of Microbiology, Saveh Branch, Islamic Azad University, Saveh, Iran

*isamohammadpour@yahoo.com

(Received: 1 Jan 2015; Revised: 26 Aug 2015; Accepted: 4 Sep 2015)

Abstract

Background and purpose: Fascioliasis is one of the zoonotic diseases in the world that has public health and economic perspectives. The aim of this study was to investigate the prevalence of Fascioliasis in slaughtered cattle in the industrial slaughterhouse of Arak, Iran (2007-2010).

Materials and Methods: This study sample was consisted of 648994 head of cattle including 292797 sheep, 81012 cows, and 275185 goats that were studied using a macroscopic method. Data analysis was performed by chi-square test and SAS software.

Results: The prevalence frequency of Fascioliasis in all slaughtered cattle was 7657 head that the most infected of animals was belong to sheep by 3280 head infection, and afterward 3037 and 1340 head of goats and cows were infected, respectively. There is a significant difference between seasons in each year ($P < 0.05$).

Conclusion: Although the prevalence of Fascioliasis infection is relatively low, but imposing economic losses due to the deleting of infested organs of animals and decrease in livestock products, indicates the existence of conditions for health risks for residents which requires more inclusive and comprehensive sanitary and control measures due to this parasite's life cycle and transmission.

[Sayadi M, Rezaei M, Jahanbakhsh M, Gholamrezaei M, *Mohammadpourfard I, Yahyaei M, et al. **The Prevalence of Fascioliasis in Slaughtered Animals of the Industrial Slaughterhouse of Arak, Iran (2007-2010)**. *Iran J Health Sci* 2015; 3(4): 59-64] <http://jhs.mazums.ac.ir>

Key words: Arak (Iran), Zoonotic Disease, Fascioliasis, Meat Safety

1. Introduction

As the population grows, demands for high quality and healthy protein sources increase. Totally, 77250000 head of sheep and goats and 8588000 head of cows are raised in Iran (1). These folks of livestock are the main protein sources for the society. In spite of qualitative and quantitative improvement of health and disease prevention measures, there is still a great deal of financial loss sustained all around the word due to parasite caused diseases transmittable by food. Estimates show that the figure of losses hits a considerable amount annually. The losses are comprised of costs to diseases treatment, and prevention spread of diseases, economic losses due to increase in mortality rate of livestock, measures to dispose of livestock corps, and loss of profit (2,3). Fascioliasis is one of the most common zoonotic diseases in many countries that lead to reduction in livestock productions. The disease is transferable to human and brings in considerable economic and financial losses (4,5). Moreover, Fascioliasis is classified as emerging and re-emerging diseases by International Food Technology Institute (6). *Fasciola hepatica* occurs in temperate areas (7). The disease is epidemic in the most of countries with large stock raising sector. Fascioliasis is mainly endemic in mild and torrid zones so that it is usually found in Europe, The North/South America, Asia, Oceanic, and North and South of Africa (8). In addition to veterinary weight and economic losses caused by the disease; it is commonly regarded as a major challenge to public health. A human may be infected accidentally by *Fasciola* (5,9).

The presence of the liver flukes, *Fasciola* spp. in bile duct and sack of human induces Fascioliasis and liver disorders (10). Infection of livestock with the parasite has been reported from all Iranian provinces. Usually, infection among livestock results in a considerable decrease in livestock production (meat, wool, and milk) and also removal of the liver in slaughterhouse. The presence of

larvae in bile duct and sac is without symptoms, and most of the cases are diagnosed by inspection. Surveys in the slaughterhouses nationwide showed 8.57% of infection in Tabriz, 14.54% in Khorasan Razavi and 7.75% in Fars (11,12). In addition to economic losses, the parasite is a great threat to public health (13). This study determines spread of the diseases among livestock slaughtered in Arak city on the base of the year, season, and type of animal. The results will be helpful for health officials for adopting more effective preventive and controlling measures.

2. Materials and Methods

The study was conducted as descriptive and cross-sectional study with a statistic society of all livestock slaughtered in the industrial slaughterhouse of the city between 2007 and 2010. Sampling was conducted randomly by attending the site. According to the data, about 450 heads were slaughtered per day during a 4-year period, which comes of 648994 heads of livestock (54.11% sheep, 12.48% cow, 42.4% goat). Thus, 292797 heads of sheep, 81012 heads of cow, and 275185 heads of goats were adopted.

The study used direct microscopic observations so that samples were examined visually and under the microscope at the site. To test infection by Fascioliasis, the appearance of liver and bile ducts were examined.

The prevalence of Fascioliasis was calculated as the number of livers found to be untrimmed with parasites, expressed as a percentage of the total number of cattle, sheep, and goat slaughtered. A percentage to measure prevalence was the statistical tools applied. The differences between frequencies of Fascioliasis infection in the different seasons in each year and between the years was analyzed with statistical software SAS (version 9.1, SAS Institute, Inc., Cary, NC, USA) by chi-square method with 5% level of significance.

3. Results

The results showed 1.18% (7657 cases) infection by Fascioliasis, so that cattle with (1.65%) contaminated cases were at top, followed by sheep (1.12%) and cows (1.10%). The variation in the prevalence of Fascioliasis among species may be explained by the fact that species have a different type of grazing behavior (Table 1). On the seasonal bases, the surveys showed that maximum and minimum spread of the disease were in autumn and winter, respectively ($P < 0.05$) (Figure 1). In general, 2008 was the most contaminated years (2.04%), while 2007 won as the year with

minimum contamination (0.69%) (Figure 2). As the results showed, the rate of infection with Fasciola among livestock in years from 2007 to 2010 was 0.69, 2.04, 1.49, and 0.84 percent respectively. There is a significant difference between seasons in each year ($P < 0.05$) (Table 1). However, these differences did not show a clear procedure among the years. The prevalence of Fascioliasis between the years in any type of animal had significant difference ($P < 0.05$) (Table 2). These different could be due to a variety of weather condition in each year. The greatest Fascioliasis for all years was found for cattle, except 2008 years.

Table 1. Prevalence of Fascioliasis infection in slaughtered animals in the Arak, Iran (2007-2010)

Cattle			Sheep			Goat		
Season	Total slaughter	Fasciolosis (%)	Season	Total slaughter	Fasciolosis (%)	Season	Total slaughter	Fasciolosis (%)
2007			2007			2007		
Winter	21532	0.41	Winter	82394	0.20	Winter	85342	0.41
Spring	3967	3.02	Spring	14773	1.30	Spring	14854	1.02
Summer	5162	2.63	Summer	19171	0.92	Summer	16879	0.82
Autumn	4250	2.28	Autumn	14181	1.59	Autumn	15467	1.30
Total	34911	1.26	Total	130519	0.58	Total	132542	0.64
2008			2008			2008		
Winter	4697	1.41	Winter	15068	1.46	Winter	10164	2.04
Spring	3567	1.57	Spring	18357	1.02	Spring	12248	1.84
Summer	5296	1.59	Summer	38941	2.29	Summer	15982	2.93
Autumn	4428	2.87	Autumn	14959	2.53	Autumn	15310	2.14
Total	17988	1.85	Total	87325	1.92	Total	53704	2.29
2009			2009			2009		
Winter	4141	1.59	Winter	11229	2.54	Winter	12155	1.77
Spring	3047	4.79	Spring	10268	1.11	Spring	12630	0.91
Summer	4423	1.38	Summer	19282	0.42	Summer	16975	1.56
Autumn	3405	2.67	Autumn	8660	1.80	Autumn	10757	1.38
Total	15016	2.42	Total	49439	1.29	Total	52517	1.41
2010			2010			2010		
Winter	3460	1.94	Winter	7991	0.88	Winter	6791	1.09
Spring	3326	1.56	Spring	8496	0.55	Spring	8420	0.51
Summer	3347	0.78	Summer	3170	1.29	Summer	10770	0.37
autumn	2964	1.92	Autumn	5857	0.85	Autumn	10441	0.62
Total	13097	1.54	Total	25514	0.82	Total	36422	0.61
Total	81012	1.65	Total	292797	1.12	Total	275185	1.10
(2007-2010)			(2007-2010)			(2007-2010)		

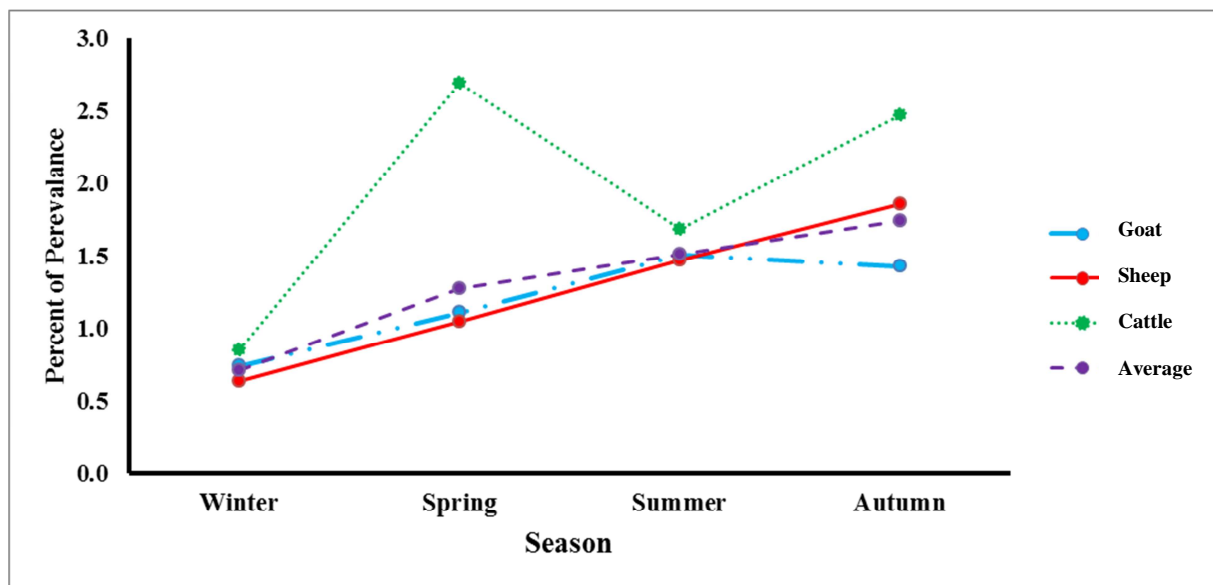


Figure 1. Seasonal prevalence (%) of Fascioliasis in slaughtered animals

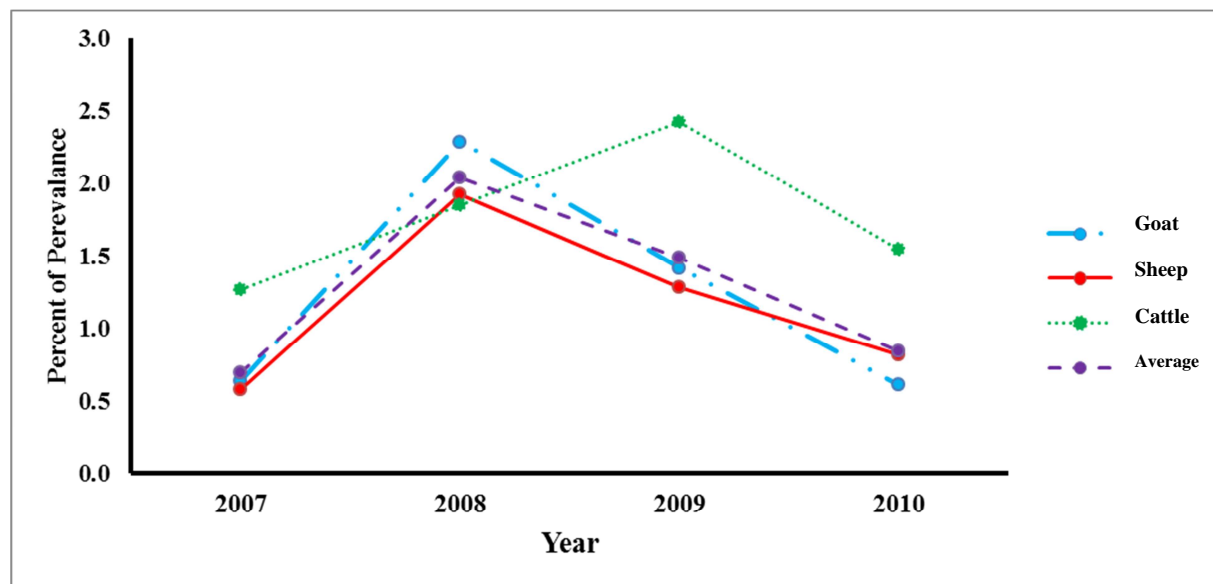


Figure 2. Annual prevalence (%) of Fascioliasis in slaughtered animals

Table 2. The prevalence of Fascioliasis (%) between the years

Type	2007	2008	2009	2010
Cattle	1.2 ^a	1.8 ^b	2.4 ^c	1.5 ^{ab}
Sheep	0.5 ^c	1.9 ^b	1.2 ^a	0.8 ^d
Goat	0.6 ^a	2.2 ^b	1.4 ^c	0.6 ^a

^{a,b,c}Least squares means within the same row without a common superscript differ (P < 0.05)

4. Discussion

The issue of Fascioliasis has been subject to numerous works. In study that was performed by Mahami-Oskouei et al. (11) rate of Fascioliasis infection in six provinces of Iran

(East Azerbaijan, Khorasan Razavi, Fars, Markazi, Khuzestan, Mazandaran) among the sheep and the cow was reported 1.1% and the figure obtained for Markazi province was 1%, which is consistent with our result.

Abdulkhikim and Addis outspread of Fascioliasis among the sheep, the cow, and the goat in Utopia were reported 21% (14). In addition, Khan and Maqbool focused on outspread of Fascioliasis among the cow under different raising conditions in Punjab-Pakistan. The study reported infection with Fasciola in slaughterhouse (22.6%), cattle at livestock farm (17.5%), veterinary hospitals (10.82%), and household cattle (8.76%) (15). Prevalence of Fasciola infections of sheep in Middle Awash River Basin was studied and overall Fascioliasis infection 13.2% was reported by Ahmed et al. (16). The present finding was found to be lower than the result of the previous study conducted by Ahmadi and Meshkehkar (17) who reported prevalence of 35.5% in Khuzestan. The finding of the present research was slightly lower than previous study conducted by Jahed Khaniki et al. (18) in slaughtered animals of Iran who reported the infection rate of Fasciola spp. with 4.32% in cattle, 1.85% in sheep, and 1.56% in. In Punjab province, rate of infection among the in slaughtered buffaloes, buffaloes at livestock farms, veterinary hospitals and in household buffaloes were reported 25.59%, 26.16%, 13.7%, and 10.5%, respectively (19). Hussien et al. (20), showed that 24.29% of male cattle were infected with Fascioliasis. The prevalence of Fascioliasis in sheep and goats of Amol Abattoir, Iran, were 7.7% and 5.4%, respectively (21). Jahed Khaniki et al (18). carried out a study in slaughtered animals of Iran and reported the infection rate of Fasciola spp. with 4.32% in cattle, 1.85% in sheep, 1.56% in goats, 1.31% in camel, and 9.31% in buffalo. Furthermore, reported that the most contributing parasites to marketable liver condemnation were hydatid cyst in sheep, goat and camel, and Fasciola spp. in cattle and buffalo, and the average annual cost for condemned livers was 8.2 million USD. In terms of contamination with Fasciola, our results lower than when compared to the values in literature. The inconsistency between

our results and those by other studies might be due to climate and health condition differences that resulted in a higher rate of infection. Fascioliasis is one of the zoonotic diseases in the world that has public health and economic perspectives. Many factors can be effective on the prevalence of Fascioliasis. This study showed that the type of species, maintenance condition, and weather condition can be effective on the prevalence of Fascioliasis.

Conflict of Interests

The Authors have no conflict of interest.

Acknowledgement

Authors thank the authorities of slaughterhouses Arak (Iran) for assistance in collecting samples.

References

1. Ministry of Agriculture Jihad. Agricultural statistics. Tehran, Iran: Information and Communication Technology Center, Ministry of Agriculture Jihad; 2011. [In Persian]
2. Moshfe AA, Bagheri M, Nobandeghan M. Prevalence of Fasciola hepatica in slaughtered livestock in Yasuj's slaughterhouse 1381-1382. *Armaghane-Danesh* 2003; 8(30): 25-33. [In Persian]
3. Fallah M, Matini M, Kia EB, Mobadi I. Study of zoonotic tissue parasites (hydatid cyst, Fasciola, dicrocoelium and sarcocystis) in Hamadan abattoir. *Sci J Hamdan Univ Med Sci* 2010; 17(3): 5-12. [In Persian]
4. Aryaeipour M, Rouhani S, Bandehpour M, Mirahmadi H, Kazemi B, Rokni MB. Genotyping and phylogenetic analysis of Fasciola Spp. isolated from sheep and cattle using PCR-RFLP in Ardabil Province, northwestern Iran. *Iran J Public Health* 2014; 43(10): 1364-71.
5. Tolosa T, Tigre W. The prevalence and economic significance of bovine fasciolosis at Jimma, abattoir, Ethiopia. *The Internet Journal of Veterinary Medicine* 2015; 5(1): 1-10.

6. Orlandi PA, Chu D, Bier JW, Jackson GJ. Parasites and the food supply. *Food Technology* 2002; 56(4): 72-81.
7. Alasaad S, Soriguer RC, Abu-Madi M, El BA, Jowers MJ, Banos PD, et al. A TaqMan real-time PCR-based assay for the identification of *Fasciola* spp. *Vet Parasitol* 2011; 179(1-3): 266-71.
8. Agatsuma T, Arakawa Y, Iwagami M, Honzako Y, Cahyaningsih U, Kang SY, et al. Molecular evidence of natural hybridization between *Fasciola hepatica* and *F. gigantica*. *Parasitol Int* 2000; 49(3): 231-8.
9. Ezatpour B, Hasanvand A, Azami M, Anbari K, Ahmadpour F. Prevalence of liver fluke infections in slaughtered animals in Lorestan, Iran. *J Parasit Dis* 2014; 1-5.
10. Hatami H, Asmar M, Masoud J, Mansouri F, Namdaritabar H, Ramazankhani A. The first epidemic and new-emerging human Fascioliasis in Kermanshah (Western Iran) and a ten-year follow up, 1998-2008. *Int J Prev Med* 2012; 3(4): 266-72.
11. Mahami-Oskouei M, Dalimi A, Forouzandeh-Moghadam M, Rokni MB. Prevalence and severity of animal Fasciolosis in six provinces of Iran. *Feyz* 2012; 16(3): 254-60. [In Persian]
12. Movassagh Ghazani MH, Valiliou MR, Ahmadzadeh AR, Karami AR, Zirak K. The prevalence of sheep liver trematodes in the northwest region of Iran. *Turk J Vet Anim Sci* 2008; 32(4): 305-7.
13. Molazadeh P, Zohoor AR. Prevalence of liver termatods and hydatid cyst in livestock, Jiroft, Iran, 2001. *J Res Health Sci* 2002; 2(1): 17-22. [In Persian]
14. Abdulhakim Y, Addis M. An abattoir study on the prevalence of Fasciolosis in cattle, sheep and goats in Debre Zeit Town, Ethiopia. *Global Veterinaria* 2012; 8(3): 308-14.
15. Khan UJ, Maqbool A. Prevalence of Fasciolosis in cattle under different managemental conditions in Punjab. *Pakistan J Zool* 2012; 44(5): 1193-6.
16. Ahmed EF, Markvichitr K, Tumwasorn S, Koonawootrittriron S, Choothesa A, Jittapalapon S. Prevalence of *Fasciola* spp. infections of sheep in the Middle Awash River Basin, Ethiopia. *Southeast Asian J Trop Med Pub Health* 2007; 38(Suppl 1): 51-7.
17. Ahmadi NA, Meshkehkar M. Prevalence and long term trend of liver fluke infections in sheep, goats and cattle slaughtered in Khuzestan, Southwestern Iran. *Journal of Paramedical Sciences* 2010; 1(2): 26-31.
18. Jahed Khaniki G, Kia E, Raei M. Liver condemnation and economic losses due to parasitic infections in slaughtered animals in Iran. *J Parasit Dis* 2013; 37(2): 240-4.
19. Maqbool A, Hayat CS, Akhtar T, Hashmi HA. Epidemiology of fasciolosis in buffaloes under different managemental conditions. *Veterinary Archives* 2002; 72(4): 221-8.
20. Hussien D, Kerala F, Hagos Y, Teklu A. Prevalence of Fasciolosis and hydatidosis in male cattle slaughtered at Butajira Municipal abattoir, Southern Ethiopia. *Acta Parasitologica Globalis* 2015; 6(1): 49-54.
21. Khanjari A, Bahonar A, Fallah S, Bagheri M, Alizadeh A, Fallah M, et al. Prevalence of fasciolosis and dicrocoeliosis in slaughtered sheep and goats in Amol Abattoir, Mazandaran, northern Iran. *Asian Pac J Trop Dis* 2014; 4(2): 120-4.