Short Paper

Animal fascioliasis in coastal regions of the Caspian Sea, Iran (2006-2007)

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Summary

To determine the prevalence of animal fascioliasis in coastal regions of the Caspian Sea, during 2006-2007, a total of 2368 faecal samples were collected from sheep (n=1250), cattle (n=975) and horse (n=143). The samples were obtained directly from the rectum of animals. Floatation method was performed for determination of egg per gram of faeces (EPG). Our findings revealed the presence of *Fasciola* spp. eggs in 9.53, 7.8 and 2.5% of sheep and 32.5, 12.1 and 3.1% of cattle in Gilan, Mazandaran and Golestan, respectively. Among the horse faecal samples collected from Golestan and Gilan provinces, no eggs were found in Golestan, while 50% of those of Gilan were infected with *Fasciola* spp. Cattle was one of the most infected animals in the studied areas. A positive correlation was found between climatic conditions and animal fascioliasis. Among different meteorological factors, rainfall seems to be the strongest factor.

Key words: Fascioliasis, Caspian Sea, Sheep, Cattle, Horse

Introduction

Fascioliasis is a well known parasitic disease, with worldwide distribution, which causes great losses in livestock production and has become an important emerging food born trematode infection of increasing concern (Mas-Coma and Bargues, 1997; Mas-Coma *et al*., 2005). *Faciola hepatica* has a cosmopolitan distribution but the distribution of *F. gigantica* is limited in Asia and Africa (Torgerson and Claxton, 1999). Mixed infection with *Fasciola hepatica* and *Fasciola gigantica* is a rule in Iran (Hosseini *et al*., 2004; Ashrafi *et al*., 2006), where both species have been reported from sheep, goats, cattle (Hosseini *et al*., 2004, 2010; Meshgi *et al*., 2008), buffalo (Eslami and Zamani-Herglani, 1988), camels (Eslami *et al*., 2004), horses (Eslami and Nadealian, 1987) and wild boar (Eslami and Farsad-Hamdi, 1992). The major sources of fascioliasis of domestic animals from Iran, which are widely distributed are both species. Human infection was reported in many provinces including Gilan, Mazandaran, Kermanshah, Zanjan and Isfahan. Human cases have been reported throughout the country over a long period (Massoud, 1993; Rokni *et al*., 2002). Two major epidemics and several interepidemics occurred during the 1980s, and 1990s in Gilan province (Yadegari *et al*., 1990; Assmar *et al*., 1991; Massoud, 1993; Rokni *et al*., 2002). Human infection has been reported in Mazandaran, it seems human fascioliasis should be distributed in this province (Massoud, 1990, 1993; Assmar *et al*., 1991; Moghadam *et al*., 2004). Despite the global significance of *Fasciola* sp. livestock, few investigations have been carried out on animal fascioliasis in Gilan, Mazandaran and Golestan provinces (Rokni *et al*., 2002; Hosseini *et al*., 2010). The aim

of this study was to determine the prevalence of animal fascioliasis in the provinces along the Caspian Sea.

Materials and Methods

Studied areas

This study was carried out during 2006-2007 in Gilan, Mazandaran and Golestan provinces along the Caspian Sea, in the north of Iran (Fig. 1).

In these regions, the existence of numerous water resources plays a vital role in determining the climate of Northern provinces. According to the Iranian organization of meteorology, the amount of rainfall and moisture decreases as moving from the northwest of the Caspian Sea in Gilan to the northeast in Golestan (Table 1). The population of sheep in the provinces of Gilan, Mazandaran and Golestan is 897,000, 2,000,000 and 1,335,000, respectively and the native cattle population in the same provinces is 690,000, 618,000 and 69,300, respectively. The population of horse is 21,800, 13,000, and 21,600 head.

Meteorologically, no difference can be observed among temperatures in the three provinces under study, but the rate of annual precipitation in Gilan was higher than Mazandaran and Golestan. Again the rate of evaporation was higher in Golestan than the other provinces (P=0.001).

Faecal examination

Faecal samples were collected directly from the rectum of 640, 410 and 200 native sheep and 600, 215 and 160 native cattle from Gilan, Mazandaran and Golestan provinces, respectively and also 78 and 65 faecal samples of horses from Gilan and Golestan were examined. For determination of *Fasciola* egg per gram (EPG) of faeces, floatation method using Clyaton-lane centrifuge and a mixture of saturated zinc chloride and saturated sodium chloride solution (SG: 1.52) were used.

Statistical analysis

Statistical analyses were applied by using Chi-square and one way ANOVA on the data.

Results

The results of faecal examination are summarized in Table 2.

According to Table 2, Gilan was the most and Golestan was the least infected regions with *Fasciola*. Meanwhile, prevalence of cattle fascioliosis in Gilan was significantly higher than the other two provinces (P=0.001). The prevalence of *Fasciola* in sheep from Gilan and Mazandaran were similar and higher than that of Golestan (P=0.001). No eggs were found in horses from Golestan, while 50% of those from Gilan were infected with *Fasciola* spp. The number of egg per gram in all 3 provinces was in the same level of 6.9, 7.2 and 5.8 in Gilan, Mazandaran and Golestan, respectively.

Discussion

In the present study a high prevalence (9.35%-50%) of fasciolosis was observed in Gilan. The high prevalence of fasciolosis in cattle and horse reported in Gilan was in line with that of Eslami *et al*. (2009), but is much less (32#9.53) than that of sheep in the

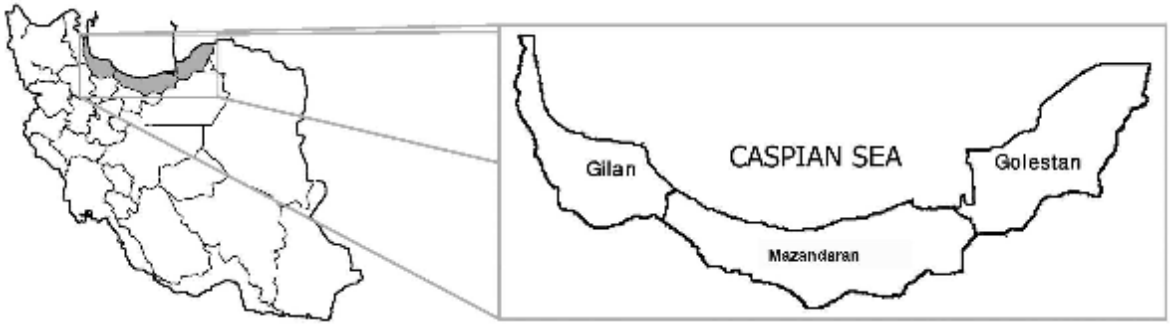

Fig. 1: Three studied provinces along the Caspian Sea

Table 1: Climatic parameters in 3 studied provinces of Caspian Sea

	Climatic parameters			
Province	Temperature (°C)	Rainfall (mm/year)	Humidity (%)	Evaporation (%)
Gilan	16.6	1438	82	85
Mazandaran	17.2	952	82	99
Golestan	18.5	447	71	132.1

Table 2: Prevalence of animals *Fasciola* sp. in 3 provinces along the Caspian Sea (2006-2007)

Province	Animal	No. examined	No. infected	% infection	Mean EPG (range)
Gilan	Sheep	640	61	9.53	5.2 (4-16)
	Cattle	600	195	32.5	7.6 (1-15)
	Horse	78	39	50	8 (2-12)
Mazandaran	Sheep	410	32	7.8	6.1 (1-16)
	Cattle	215	26	12.1	8.2 (1-23)
Golestan	Sheep	200	5	2.5	5.1 (1-9)
	Cattle	160	5	3.1	6.4 (1-15)
	Horse	65	0	0	0

same area. Similar prevalence rate was reported from cattle in Gilan (33.4%) (Hosseini *et al*., 2010). The results of the present study are in accordance with Moghadam *et al.* (2004) in Mazandaran, who found 7.3% of sheep and 25.4% of cattle harbored *Fasciola*, in which infection in cattle is higher than our corresponding results. Gilan is one of the most populated cattle breeding areas in Iran with approximately 690,000 native cattle. However, they were frequently ignored with regard to treatment. Despite cattle being the most infected animal, but taking into consideration the sheep population and their free roaming in the environment, sheep is still the most important source of infection for human beings as well as animals.

Our findings showed that horse could play an important role in dissemination of *Fasciola* egg in Gilan province but not in Golestan. In addition to climatic conditions, because Golestan province is a center for breeding of race horses, much more attention is paid to their health and disease. Although the population of horses in Gilan is scarce, due to the high rate of infection, they may be important in the spreading as well as in the transmission of *Fasciola* in Gilan province. Mas-Coma *et al*. (1998) have also observed that donkeys contribute to disease transmission in Bolivia.

Although differences were observed among rainfall, humidity and evaporation in the studied provinces, the rate of precipitation in Gilan is higher than Mazandaran and much higher than Golestan (P=0.001). These conditions along with less rainfall produce a less favorable condition for development of snails as the intermediate hosts in Golestan. Contrary to this, Gilan with higher rainfall (1438 mm per year) and less evaporation has enough humidity for development of snails. Therefore, there is an increase in the rate of infestation with *Fasciola* spp. in Gilan province compared to other provinces. These findings indicate that fasioliasis is mainly a rainfall dependent disease and the rate of infection in animal is related to these factors. Although the prevalence of *fasciola* spp. in Gilan and Mazandaran was high, the number of egg per gram in all 3 provinces was low and nearly similar. It has been shown that any egg count of this parasite is significant and heavy infection may be indicated by over 25 EPG (Love and Hutchinson, 2003), however there is little relationship between egg count and fluke burden (Torgerson and Claxton, 1999; Love and Hutchinson, 2003).

In conclusion, fascioliasis is an economically important disease in livestock and human in the north of Iran, especially in Gilan and Mazandaran. Several outbreaks of human infection were recorded from Gilan province between 1989-1999 (Massoud, 1990; Yadegari *et al*., 1990; Ashrafi *et al*., 2006). It seems that education of people and

strategic treatment of animals should be considered in control of disease in endemic areas.

References

Ashrafi, K; Valero, MA; Panova, M; Periago, M; Massoud, J and Mas-Coma, S (2006). Phenotypic analysis of adult of *Fasciola hepatica*, *Fasciola gigantica* and intermediate forms from the endemic region of Gilan, Iran. Parasitol. Int., 55: 249-260.

Assmar, M; Milaninia, A; Amir-Khani, A; Yadegari, AD; Forghanparast, K; Nahravanian, H; Pizak, N; Esmayli, A; Hovanesian, A and Valadkhani, Z (1991). Seroepidemiological investigation of fascoliasis in northern Iran. Med. J. Islamic Repub. Iran. 5: 23-27.

Eslami, A and Farsad-Hamdi, S (1992). Helminth parasites of wild boar, *Sus scrofa* in Iran. J. Wildl. Dis., 28: 316-318.

Eslami, A; Hosseini, SH and Meshgi, B (2009) Animal fasciolosis in north of Iran. Iranian J. Publ. Health. 38: 132-135.

Eslami, A and Nadealian, MG (1987). A report on the platyhelminth infection of equines in Iran. J. Fac. Vet. Med., University of Tehran. 42: 33-38 (in Persian).

Eslami, A; Ranjbar-Bahadori, Sh; Eskandari, A and Sedaghet, R (2004). Prevalence and pathology of camel fascioliasis in Iran. J. Fac. of Vet. Med., University of Tehran. 58: 97-100 (in Persian).

Eslami, A and Zamani-Herglani, Y (1988). Study on helminth infections of buffaloes under slaughterhouse conditions. J. Fac. Vet. Med., University of Tehran. 2: 25-34 (in Persian).

Hosseini, SH; Jlochani, M; Bahonar, AR and Eslami, A (2010). Cattle fascioliasis in Gilan province, Iran. Int. J. Vet. Res., 4: 57-60.

Hosseini, SH; Vaezi, V; Jafari, G; Rezaei, A and Carami, G (2004). Epidemiological study of fascioliasis in Kermanshah province. J. Fac. of Vet. Med., University of Tehran. 59: 201-206 (in Persian).

Love, SCJ and Hutchinson, GW (2003). Pathology and diagnosis of internal parasites in ruminant, in gross pathology of ruminants. *Proceeding 350, graduated foundation*. University of Sydney, Sydney, Australia, Chapter 16. PP: 309-338.

Mas-Coma, S and Bargues, MD (1997). Human liver flukes: a review. Res. Rev. Parasitol., 57: 145-218.

Mas-Coma, S; Bargues, MD and Valero, MA (2005). Fasciolosis and other plant-borne trematode zoonoses. Int. J. Parasitol., 35: 1255-1278.

Mas-Coma, S; Rodriguez, A; Bargues, MD; Valero, MA; Coello, JR and Angles, R (1998). Secondary reservoir role of domestic animals other than sheep and cattle in fasciolosis transmission on the northern Bolivian Altiplano. Res. Rev. Parasitol., 57: 39-46.

Massoud, J (1990). Fascoliasis outbreak of man and drug test (triclabendazole) in Caspian Littoral, northern part of Iran, 1998. Bull. Soc. Fr. Parasitol., (Suppl. 1), 8: 438.

Massoud, J (1993). Present status of human fascioliasis in Iran. In: *Food-borne trematodes*. World Health Organization, WHO Manual, Manila, Mimeogr. Rep WHO Manual, Manila, Mimeogr. Rep Sch/SG/93 w, P: 19.

Meshgi, B; Eslami, A and Hemmatzadeh, F (2008). Determination of somatic and excretory antigens of *Fasciola hepatica* and *Fasciola gigantica* using SDS-PAG. Iranian J. Vet. Res., 9: 77-80.

Moghadam, AS; Massoud, J; Mahmoodi, M; Mahvi, AH; Periago, MV; Artigas, P; Fuentes, MV; Bargues, MD and Mas-Coma, S (2004). Human and animal fascioliasis in Mazandaran province, northern Iran. Parasitol. Res., 94: 61-69.

Rokni, MB; Massoud, J; Neill, SM; Parkinson, M and Dalton, JP (2002). Diagnosis of human fasciolosis in the Gilan province of northern Iran, application of cathepsin L-ELISA. Diag. Microbiol. Infect. Dis., 44: 175-179.

Torgerson, P and Claxton, J (1999). Epidemiology and control. In: Dalton, JP (Ed.), *Fasciolosis*. (1st Edn.), CAB International Publication. UK. PP: 113-149.

Yadegari, D; Forghanparast, K and Assmar, M (1990). Investigation of an epidemic of fascioliasis in north Iran. 7th international congress of parasitology. Paris. Bull. Soc. Fr., Parasitol., (Suppl. 2), 8: 868.