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Original Article

Seroprevalence of Human Fasciolosis in Pirabad, Lorestan Province, Western Iran

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Abstract

Background: The purpose of this study was to perform seroepidemiological investigation for determining the status of human fasciolosis in Pirabad Village, Lorestan Province, western Iran.

Methods: Blood samples were taken from residents of the village including 801 individuals. Sera were separated and stored at -20°C until used. The samples were analyzed using ELISA.

Results: Anti-*Fasciola* antibodies were detected in 6 (0.7%) individuals. Difference between age, sex and drinking or swimming in the surface water with seropositivity to fasciolosis was not significant. Out of 7 shepherds, 1 (14.3%) was seropositive. Due to the small number of shepherds, comprehensive statistical inference in this regard cannot be done. Significant difference was detected between seropositivity to fasciolosis and consuming local freshwater vegetables during the last 6 months (P=0.001).

Conclusion: Metacercariae carrying local freshwater plants might be the main source of contamination because consumption of these kinds of vegetables was confirmed by all participants. Awareness of local communities regarding the danger of freshwater plant consumption, through health education programs, will decrease the risk of infection.

Introduction

Fasciolosis is prevalent in various parts of the world, especially in areas where livestock raising is common (1-3). Fasciolosis has been recognized as one of the important problems in veterinary medicine. It has caused significant damage to the livestock industry in different regions of the world (2). WHO has included this disease in the list of the most important foodborne helminthic diseases (4). Fasciolosis has been also introduced as an emerging or re-emerging disease by International Institute of Food Technology (5).

The reservoir hosts are ruminants and herbivores. Human is infected through consuming aquatic vegetables infected with *Fasciola* metacercaria (6).

Hepatic fasciolosis affects the bile ducts of ruminants and herbivores, as well as human.

About 2.4-17 million people are infected with *F. hepatica* and *F. gigantica* and 91.1 million people are at high risk of being infected with these parasites (7). Because of current changes in climatic conditions in the world, both fasciolids will continue to infect more humans and animals (8). Iran is considered among endemic regions for this disease. Fasciolosis has caused two major epidemics in Iran: one in 1989 and the other in 1999, which have been the largest ever epidemics of fasciolosis in the history according to WHO documents (9).

Kermanshah Province, western Iran, has been introduced as an emerging focus of human fascioliasis following the report of 17 cases from a village located in Kangavar district (10, 11). Some cases of human infection have recently been reported from Yasuj City of Kohgiluyeh and Boyer-Ahmad Province, south-west of Iran (12).

Western Province of Lorestan, located at southeastern part of Kermanshah province, is an endemic region for cutaneous leishmaniasis (13, 14). During a surgery on an infected 31-year-old housewife, a mature worm was found in her liver. She was suffering from anemia and hepatomegaly. She was living in Pirabad village of Doroud district without any history of travel during last two years (According to the report by Department Of Disease Control and Prevention affiliated to Deputy of Health at Lorestan University of Medical Science). On the other hand, consumption of raw wild grown freshwater plant (*Nasturtium officinalis*) locally named "Balmak" contaminated *with* metacercariae of *F. hepatica* is common in this area. In addition, clinical symptoms similar to those, which are seen in fascioliasis patients, have been observed among some individuals visiting health centers in study area.

Fig. 1: *Nasturtium officinalis L* (Locally nam Balmak) which commonly consumed in study area

Several methods are used for the diagnosis of fasciolosis. Serological methods, which detect anti-Fasciola antibodies in blood serum of infected individuals, are important for the diagnosis of human and animal fascioliasis (15).

The several studies on frequency of different parasites in Lorestan province were conducted but there is no data about seroprevalence of fasciolosis (16- 19).

The aim of the present study was to conduct seroepidemiological investigation for determining the status of human fasciolosis in

Pirabad village, Doroud city, Lorestan province, Iran.

Materials and Methods

Samples collection

In this cross-sectional study, the blood samples were taken from all residents of Pirabad village including 801 individuals in 2014. The questionnaire used in this study was designed based on the variables including sex, age, education, occupation, consumption of local freshwater vegetables, and clinical symptoms. Well-trained individuals filled out the questionnaires and collected the samples.

The study was approved by the Medical Research Ethics Committee of Lorestan University of Medical Sciences, letter No. 200/82204. In addition, consent was obtained from participants or their guardians.

After blood sampling, sera were obtained and stored at -20 °C until use. The collected serum samples were analyzed using ELISA method that was conducted already (20). Finally, absorbance was measured by an ELISA reader at 490 nm and Ref. wave of 650 nm.

Statistical Analysis

Data analysis was performed using descriptive statistical indicators. Chi-spuare statistic and Fisher's exact test were employed to investigate the possible statistical difference between categorical variables. $P<0.05$ was considered as significant.

Results

The mean age of participants was 28.3±17.7 yr old. The youngest and oldest people were 1 and 90 yr old, respectively.

Using ELISA method, anti-*Fasciola* antibodies were detected in 6 (0.7%) cases. Cut-off point was calculated as 0.32 using X+3SD formula. All seropositive individuals showed no clinical symptoms.

Difference between age and drinking or swimming in the surface water during the last 6 months with seropositivity to fasciolosis was not significant ($P>0.05$) (Table 1). Seropositivity to fasciolosis between the female and male subjects was 0.8% and 0.6%, respectively, which was not statistically significant ($P=0.075$) (Table 1).

Seropositivity according to occupation and level of education is reported in Table 1.

Significant difference was reported between seropositivity to fasciolosis and consuming local freshwater vegetables during the last 6 months ($P=0.001$). All people who had consumed local freshwater vegetables were seropositive (Table 1).

Snails collected from the lakes were different genera including *Lymnaea* but there was no *L. truncatula* and *L. gedrosiana*.

Discussion

Although the prevalence of animal fascioliasis has been decreased during the past decades, human fascioliasis appeared as a public health problem in Iran. The credibility of new foci of human fascioliasis requires to do further standard studies (21).

Out of 801 studied subjects, 6 samples (0.7%) had a positive serological test result. In this study, no significant relation was observed between seroepidemiology of fasciolosis and age ($P=0.11$). Results of several related studies have indicated higher seroprevalence in a specific age group. In Anzali City, most subjects with positive test were younger than 35 yr old (22). In the north of Iran, the prevalence among people less than 20 yr old was significantly higher than other age groups (23). In Meshkinshahr City, Iran, the majority of the infected subjects were within the age range of 40-49 years old (24). In the present research, there was no significant relation between sex and seroprevalence ($P=0.75$). This result was in agreement with the results of several studies (10, 12), while a number of other studies have reported the seroprevalence of a specific sex to be higher (11, 25).

Table 1: Seroprevalence of anti-*Fasciola* antibodies according to epidemiological factors observed in Pirabad village, Lorestan Province, West of Iran, in 2014

Variable	No. of samples	Frequency of anti-*Fasciola* antibodies n(%)	*P value*
Gender			
Male	317	2(0.63)	0.75
Female	484	4 (0.83)	
Level of education			
Low literate	701	6(0.86)	0.01
Diploma	75	0(0.00)	
Academic degree	25	0(0.00)	
Age group (years)			
1-19	308	2(0.65)	0.11
20-39	283	0(0.00)	
40-59	156	3(1.92)	
>=60	54	1(1.85)	
Occupation			
Ranchman	7	1(14.3)	<0.001
Farmer	28	0(0.00)	
Employee	14	1(7.14)	
Self-employment	58	1(1.72)	
Student	284	2(0.70)	
Housewife	208	1(0.5)	
Unemployed	202	0(0.00)	
Use of local freshwater vegetables			
Yes	259	6(2.32)	0.001
No	542	0(0.00)	
History of travel to the South province			
Yes	121	0(0.00)	0.59
No	680	6(0.88)	

For example, according to Asmar et al. on Iranian residents in the northern Iran, seroprevalence among women was reported to be 1.16 times of that among men (23). On the other hand, in Meshkinshahr City, the prevalence was reported to be higher among men than women (24).

In the villages of Iran, women and men in all age groups participate in outdoor activities such as grazing livestock, and spend most of their daily time outside the house. Therefore, women and men have the same conditions in terms of exposure to environmental disease factors, which could be the reason for the insignificant relationship between the seroprevalence of fasciolosis and sex as well as age groups.

Results of the present research showed that in low literate people seropositivity to *F. hepatica* was more than other groups but due to the difference in the number of people at different levels, comprehensive statistical inference in this regard cannot be done.

Animal husbandry is one of the most common and important occupations in rural area in Lorestan Province, Iran. Ranchmen spend most of their daily time in nature away from their home for grazing animals. Livestock is taken for grazing to specific areas, which are both green and contain lake. If the animal is

infected with *Fasciola*, then it can also infect water and vegetables; after, parasites' life cycle has passed, people could be infected via the consumption of local freshwater vegetables in the region.

In this study, out of 7 shepherds, 1 (14.3%) was seropositive. However, because of the small number of shepherds, ccomprehensive statistical inference in this regard cannot be done.

In present research, out of 801 people, 259 (32.33%) consumed freshwater vegetable watercress that local name is Balmak. All seropositive people had a record of eating this vegetable and there was a significant relationship between the consumption of Balmak and seropositivity to *F. hepatica* (P=0.001). In an epidemic disease in 1988 in Gilan Province, 91% of the infected people had used a local vegetable *Mentha piperita* called "khalvash" in Iran (26).

Two types of fresh water snails, namely *L. truncatula* and *L. gedrosiana*, have been introduced as intermediate hosts sensitive to *F. hepatica* and *F. gigantica* in Iran, respectively (2, 27). Studies have indicated the widespread presence of *L. truncatula* in almost all regions of Iran, except Bushehr Province, and presence of *L. gedrosiana* in all regions of Iran, which confirms high potential of Iran for the transmission of this disease (23, 28). It is recommended to use molecular methods to identify exactly types of snail species as well as *Fasciola* infections in the snails of this region.

Conclusion

Because all of seropositive persons used the local freshwater vegetables, it seems that the contamination occurred through the consumption of these vegetable. Health education to residents in order to increase awareness about not using of local freshwater vegetables to control and prevention is necessary.

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