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Estimation of *schistosomiosis* infection rate in the sheep in Shiraz region, Fars province, Iran

Research Article

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ABSTRACT

Schistosomiosis, due to *Schistosoma turkestanicum*, is a very important disease. It can cause growth reduction, decrease wool product, reduce meat products and cause weight loss in sheep herds. According to the present records, this disease has spread from the north to the central parts and south of Iran. Stool samples were collected on accidental multiple trials basis from sheep herds, in different seasons of the period of study from 2011 to 2014. The samples were transferred to the laboratory and subjected to direct method and Clayton Lane method. The infection rate was totally 3 percent in the sheep. Different infection rates were observed in seven different places of Dasht Arjan. This rate was from 2 percent in Khane Zenian to 11.2 percent in Chehel Cheshmeh. The minimum number of counted eggs in 1 gram of stool was 1 egg and the maximum counted number of eggs was 6 eggs in 1 gram of stool sample. Finally, it should be noted Dashte Arjan is regarded as an infected area and other epizootic data on the presence of intermediate host, and different climatological factors should also be investigated in the future.

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Introduction

Schistosoma turkestanicum, is a species that has been renamed from *Ornithobilharzia turkestanicum* to *S. turkestanicum*. In a study (Abdulssalam and Sarwar, 1952) *Ornithobilarizia* spp was studied by ITS2 and ITS1 molecular markers collected from China and finally it was determined that this genus belonged to Schistosoma; therefore, it can be concluded that this species is from *Schistosoma (Ornithobilarizia)* genus and *Schistosomatidae* family (Abdulssalam and Sarwar, 1952). This parasite lives in the mesenteric vessels, portal vein of liver, lung and other blood vessels of sheep, goats, cattle, buffaloes, donkeys, camels, mule and boars (Ale-Dawood, 1963; Al-Toma, 2011; Arfa et al., 1965; Eslami, 1998). *S. turkestanicum* was first found in the cattle from Russian Turkestan and named *S. turkestanicum* (Eslami et al., 1998). The diagnosis of *S. turkestanicum* is troublesome. The observation of parasite eggs in stool sample is

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going the confirm the infection, but the number of eggs in stool sample is very few. This is the reason why many workers have recourse to serological tests (Geng, 1994).

This parasite has been reported in Southern Russia, China, Mongolia, Turkestan (Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan), Pakistan, India, Iraq, Turkey and Iran (Ghadirian and Hoghooghi, 1973; Hosseini et al., 1997; Karimi, 2003) and it causes economic loss from the viewpoint of decreasing different kinds of loss in products from livestock (i.e. decrease in growth, wool, meat and sheep weight) Liver cirrhosis, bile ducts degeneration, blood vessel stenosis are some of the common pathological findings in *Schistosomiosis* (Karimi et al., 2003). There are documented reports of *S. turkestanicum*, in sheep herds from Babolsar (Ghadirian and Hoghooghi, 1973), Isfahan (Karimi et al., 2014), Khouzestan (Machattie, 1936; Maleki et al., 1994). Some epizootical events were recorded from Eghlid (Fars) (Mansourian, 1995) and some parts of Mazandaran province (Ghadirian and Hoghooghi, 1973). Treatment of infected sheep with Praziquantel and Tricholorphen were unsuccessful, and no significant changes were observed in egg count before and after treatment (Massoud, 1973).

Regarding above comments and importance of *S. turkestanicum*, stool samples were collected from different part of Shiraz region. Direct method and floatation method were applied for samples, then the rate and distribution of infection was estimated and recorded.

Materials and methods

Past studies on the prevalence of *Schistosomiosis* indicated 8 to 15 percent of infection rate. Then, the number of samples needed for this study was estimated using the formula (N =). Regarding P= 0.1, d= 0.03 and 95% confident, the number of samples needed in this study is equal to 384 (n = 384). In this study, random collection in several time intervals was used (cross sectional). For better analysis and to reduce the effect of cluster sampling, number of samples was increased to 600 samples. These samples were collected two times in a year (spring, summer, fall and winter). Samples were collected from 2012 to 2014. 1200 samples were totally collected.

Shiraz district was divided into 5 geographical levels, (nomadic, south, north, east and west). 120 samples were regarded for each level.

Six villages were selected in each level; twenty sheep were selected for sample collection in each village. Nomadic herds were selected for the collection of 120 samples, and totally 1200 samples were collected. Stool samples were collected directly from rectum using a pair of sanitary gloves. Stools were kept in covered vessels. Data regarding, date of collection, place and sheep identification (age, sex, herd owner) were noted on labels on the covers and recorded in a data sheet. Samples were transferred immediately to the laboratory (near the ice packs) and subjected to flotation method (Clayton lane method) (Zinc Chloride) ($ZnCl_2$) was used for the flotation of *S. turkestanicum* eggs. The specific gravity of the solution was 1.20.

A parallel confirmative study was conducted on 30 sheep carcasses inspected in Shiraz abattoir in two different periods of times (during the time of this study). All internal parts of sheep bodies including liver, lungs, heart, kidneys, pancreas, spleen and mesenteric regions were inspected at the laboratory for the presence of adult parasite (*S. turkestanicum*).

Results

Totally, seven places located in Dashte Arjan including (Chehel Cheshmeh, Naeem Abad, Zeloa, Shilan, Nomade herds, Cheramakan, Khaneh Zanian were experimentally found to be positive regarding the presence of eggs of *S. turkestanicum* in collected samples (Figure 1 and Figure 2). Totally three percent of sheep were estimated to be infected with *S. turkestanicum* in Shiraz district. The rate of infection for positive recorded places were, 11.2 %, 10%, 8.4%, 6.7%, 5% , 4.8% and 2% respectively for above-mentioned regions (Table).

The result of the confirmative study showed there were no adult worms in 30 carcasses inspected in Fars (Shiraz) abattoir at the time of study (collection time of study).

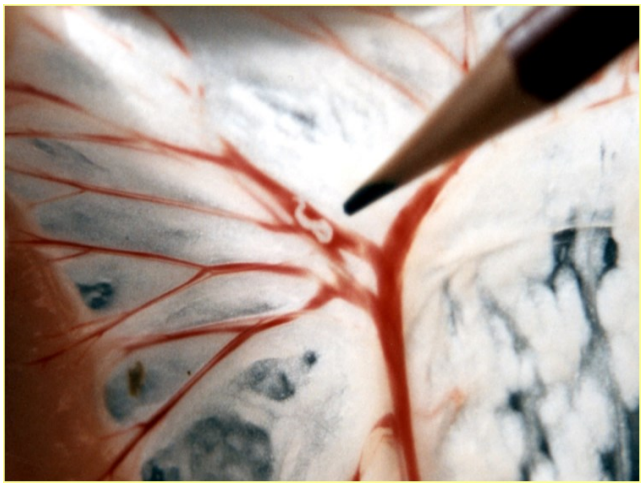

Figure 1. Original, adult stage of *Schistosoma turkestanicum* in mesenteric vessel.

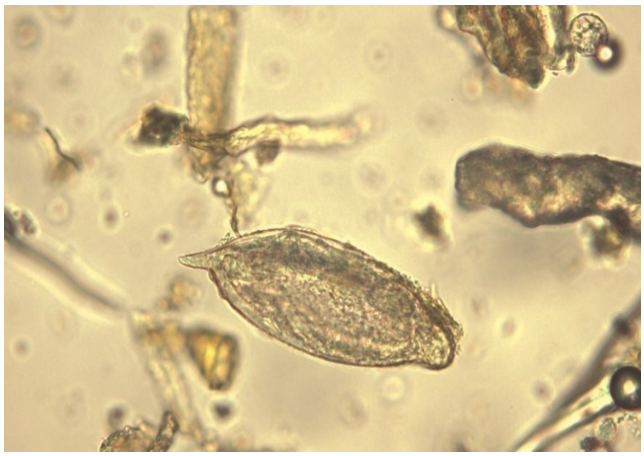

Figure 2. Original, egg of Schistosoma turkestanicum prepared by floatation method

Table 1. Different infection rate of *Schistosoma turkestanicum* in seven places in Shiraz region

Geographical places	Collected samples	Percent of positive cases
Naeem Abad	20	10
Khaneh Zanian	20	2
Chehel Cheshmeh	20	11.2
Shilan	20	6.7
Zeloa	20	8.4
Cheramakan	20	4.8
Nomade herds	20	5
Other places	1060	0
Shiraz region	1200	3

Discussion

In a pilot project research by Ale -Dawood on 1963 the infection from Dezful was recorded (Massoud, 1974). In a study by Arfa (1965) *S. turkestanicum* infection rate in sheep (28%) was reported from Dezful north of Khuzestan province for the first time, (Sahba and Malek, 1976). Maleki et al. (1994) in a pathological study on 1994 recorded the infection from Fars region, but did not regard the nomadic herds (Skerman and Hilard, 1967). In our study the 5 percent infection rate was calculated on stool samples collected from nomadic herds. Maleki et al. (1994) tissue samples were collected post-mortem from intestine, mesenteric lymphatic nodules and liver (Skerman and Hilard, 1967). The place of study was northern part of Fars (Eghlid), but the present study was done in the southern part of Fars (Dashte Arjan).

In other research on sheep herds from Southern part of Khouzestan province (Shadgan region) 13.4 percent of sheep were positive for *S. turkestanicum* (Skrjabin, 1913).

Schistosoma turkestanicum has been reported from different parts of Iran including; Khouzestan (Maleki et al., 1994; Massoud, 1974; Soulsby, 1982), Isfahan (Karimi et al., 2014), Babolsar (Massoud, 1973), Juybar (Ale-Dawood, 1963) and Fars (Eghlid) (Mansourian, 1995). Some of them were observed as epizootic event. In an epizootic case from Babolsar, [September up to the end of winter (March)], there were 60 to 80 percent of sheep which died from five herds each with 150 sheep. In a study on sheep from Babolsar, there were 72 percent positive stool samples on the basis of finding eggs of S. turkestanicum (Ale-Dawood, 1963; Massoud, 1973).

In a study by Eslami et al. (1998) in Mazandaran (Juybar) from September 1998, 17.5 percent of herds and 7.6 percent of sheep were found to be positive.

In a recent study in Mazandaran region 15 percent of sheep were reported positive for *S. turkestanicum* (Urquhart, 1987).

Iran plateau is divided to four zoological zones (Wang et al., 2009).

The *S. turkestanicum* infection has been reported from three zones (including, northern part of Alborz Mountains, central desert from western Azarbaijan to Khorasan and Persian Gulf to Tigris (Dejleh) river. There are no sheep growing in central desert of Iran, so no infection is recorded (Ale-Dawood, 1963; Yamaguti, 1958). Research studies on snails of Iran showed that Lymnaea gedrosiana is the intermediate host of this parasite (Maleki et al., 1994). These snails have been collected from different parts of Iran except Lorestan province (Maleki et al., 1994; Wang et al., 2009; Yamaguti, 1958). There are a lot of water sources and marsh-land, where sheep are kept and graze around these water sources and they could be easily infected to *S. turkestanicum*.
In this study different symptoms of sub-clinical form of infection such as harsh hair, weakness, anemia, hydrothorax, ascites, diarrhea and wool loss were seen in infected animals.

Totally three percent of sheep were estimated to be infected with *S. turkestanicum* in Shiraz region (Dashte Arjan). Regarding previous studies there is no suitable anti-parasite drug available and snail control could not be achieved when there may be different ecological problems. Finally, different responsible sectors are to be aware of the presence of infection to provide suitable measures for infection control.

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References

Abdulssalam, M., & Sarwar, M. M. (1952). *Occurrence of ornithobilharzia turkestanicum in Pakistan.* Paper presented at the 4th Pakistan Scientific Conference, Pakistan.

Ale-Dawood, M. (1963). *Dezful bilharziosis pilot project (3rd quarterly report).* Tehran, Iran: Scool of public Helth and Reaserch Institute of Hygiene.

Al-Toma, Z. (2011). The liver cirrhosis caused by Ornithobilharzia turkestanicum in Basra governorate. *Journal of College of Education, 1* (5), 61-88.

Arfa, F, Sabbaghian, H., & Ale-Dawood, H. (1965). Studies on Ornithobilharzia turkestanicum. *Annual Parasitology & Human Competetive*, 40, 45-50.

Eslami, A. (1998). Veterinary Helminthology 2th ed. (Trematoda), Tehran, Iran: University of Tehran.

Eslami, A, Sarafrazi, M, & Tabatabaee, A. H. (1998). Current status of ovine Ornithobilharzia turkestanicum infection in Juybar, Mazandaran. *Pajuhesh and Sazandegh, 10*(35), 106-107.

Geng, J. (1994). Preliminary studies on the diagnosis of cattle Ornithobilharziosis by ELISA, *Journal of Jilin Agricultural University, 16*(3), 88-91.

Ghadirian, E., & Hoghooghi, N. (1973). The presence of snails of veterinary importance in Isfahan. Iran. *British Veterinary Journal,* 129, 1-3.

Hosseini, S. H, Eslami, A, & Hadadzadeh, H. Epiolemiology of Ornithobilharzia (1997). turkestanicum in sheep in Babolsar (Mazandaran), Iran. *Journal of the faculty of veterinary Medicine, University of Tehran, 52*(3), 53-59.

Karimi, G. (2003). Epidemiological studies on Ornithobilharzia turkestanicum in sheep and its snail in Shadegan area and evaluation of serological tests for diagnosis of infection. *PhD Thesis,* Ahwaz University, Khuzestan, Iran.

Karimi, G., Akhavizadeghan, M. A, Derakhshanfar, M., & Paykari, H. (2003). A survey on infection rate of Ornithobilharzia turkestanicum in sheep in Shadeghan. *Journal of the Factutly of Veterinary Medicine, University of Tehran, 61*(4), 325-329.

Karimi, G., Paykari, H, Motamedi, G., Abdigoudarzi, M, Rivaz, S, & Alamian, S. (2014). A survey on Ornithobilharzia turkestanicum (Skrjabin, 1913) Infection in sheep of Mazandaran province, Iran, using flotation method. Pajuhesh and Sazandeghi, 27(103), 31-36.

Machattie, C. (1936). A Preliminary note on the life history of Schistosoma turkestanicum skrjabin (1913). Transaction of the *Royal Society of Tropical Medicine and Hygiene,* 30, 115-128.

Maleki, M., Khodakaram, Tafti, A., Oryan, A., Aslani, M. (1994). Macroscopic and microscopic finding of ornithobilharziosis in local nomadic herds of sheep and gouts in fars provins, *Pajouhesh and Sazandgi, 7*(24), 66-70.

Mansourian, A. (1993). Fresh water snails fauna of Iran. *PhD Thesis,* Tehran Medical Sciences University, Tehran, Iran.

Massoud, J. (1973). Studies on the Schistosomes of domestic animals in Iran. I. Observation on the Ornithobilharzia turkestanicum (skrjabin, 1913) in Khoozestan. *Journal of Helminthology* 47(2), 165-180.

Massoud, J. (1974). The effect of variation in miracidial exposure dose on laboratory infection of Ornithobilharzia turkestanicum in Lymnaea gedrosiana. *Journal of Helminthes*, 48, 139-144.

Sahba, G., & Malek, E. A. (1976). Dermatitis caused by cercariae of O .turkestanicum in the Caspian sea area of Iran . *American Journal Tropical Medicine and hygiene*, 28, 912-913.

Skerman, K, D, & Hilard, J, J. (1967). *A Handbook for studies of Helminth Parasites of Ruminants.* Tehran, Iran: Near East Animal Health institute.

Skrjabin, K. (1913). Schistosoma turkestanicum, non. ap. ein. neuri. parasitol. de rinde. Aus Russisch Turkestan, zeit. F. *Infektions Krankheit*, 13, 451-468.

Soulsby, E. J. L. (1982). *Helminths, arthropods and arotozoa of domesticated animals. 7th ed*, , London, UK: Bailliere Tindall.

Urquhart, G. M., Armour, J., Duncan, J. M., Jennings, F. W. (1987). *Veterinary Parasitology.* , London, England: Longman.

Wang, C. R., Li, L., Ni, H. B., Zhai, Y. Q., Chen, A. H., Chen, J., Zhu, X. Q. (2009). Orientobilharzia turkestanicum is a member of Schistosoma genus based on phylogenetic analysis using ribosomal DNA sequences. *Experimental Parasitology, 121*(2), 193-197.

Yamaguti, S. (1958), *Systema helminthum, the (digenea) trematodes of vertebrates.* Okayama Japan: University of Medical School.