

A Survey of Medically Important Snails of Gahar Lake in Lorestan Province, Iran

Rouhollah Valipour Nouroozi

Department of Parasitology, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Received Jul 10, 2015; accepted Sep 05, 2015

Introduction: Some snails play an important role in the transmission of helminthes, mainly trematodes of medical and veterinary importance. There seems to be no information on the freshwater snails of Gahar Lake in Lorestan province of Iran. The present study aimed to identify medically important snails of this lake. **Methods:** Samples were collected from ten localities around Gahar Lake in April 2015 by hand. The snails were classified according to shells morphology. The data were then analyzed using descriptive statistics. **Results:** A total of 6 snail species were collected from all localities. Four medically important snail species including: *Lymnaea truncatula*, *Lymnaea peregra*, *Melanoides tuberculata* and *Melanopsis* spp. were detected. *M. tuberculata* was seen in all sampling sites. *Physa acuta* and *Melanopsis* spp. were observed in five sampling sites. *Planorbis intermixtus*, *L. peregra* and *L. truncatula* were found in four, three and two sampling sites, respectively. **Conclusion:** Presence of medically important snails in Gahar Lake could be a source of trematode infections for visitors. Therefore control measures, especially biological ones should be applied to the lake. J Med Microbiol Infec Dis, 2014, 2 (3): 91-94.

Keywords: Snails, Lakes, Iran, Trematoda.

INTRODUCTION

A variety of human diseases are transmitted by vectors [1]. Snails are one of the important members of many ecological environments [2]. They have been important to humans throughout history as a source of food, tools and even pets [2]. Identification of freshwater snails is of great value since some freshwater snails serve as intermediate hosts to the trematode parasites [3, 4, 5]. Snails are infected by ingestion of the eggs or penetration of free-swimming miracidia and larval stages are formed inside the infected snail [6]. Larvae of trematodes emerge from the snail tissue, and are probable to find the suitable secondary intermediate host or definitive host by means of passive transmission or active penetration, respectively [6]. It is crucial to know the spread of freshwater snails to determine the transmission pattern of trematodes [7]. Furthermore, a clear picture of the entire snail fauna especially the species that are involved as intermediate host for the diseases are needed in order to develop interventions against snail hosts [7]. Distribution, preferred habitats and seasonal variation of snails are also required [7]. Researchers such as; Bdir *et al.* in Palestine [6], Guo *et al.* in China [8], Madsen *et al.* in Vietnam [7], Athari *et al.* in Mazandaran [9], Ektefa *et al.* in Khuzestan [10], Moghadam *et al.* in Hormozgan [11] have studied medically important snails in recent years. The most comprehensive study in Iran was conducted by Gloer and Pesic in more than ten provinces during 2005-2011 [12]. They have reported 73 species of snails from Iran [12]. Meanwhile, there seems to be no information on the snails of Gahar Lake which is located among Oshtorankooh mountain chain in Lorestan province, Iran [13]. The lake has 2.5 km length and 500 m width, approximately [13]. Hundreds of Iranian or foreign people visit this lake annually and stay there for days [13]. The visitors usually

go swimming and fishing there and the water is used for drinking, too. The present study was carried out to identify medically important snails of Gahar Lake in Lorestan province.

MATERIAL AND METHODS

Study area. Study site was located in the Lorestan province, Iran (Figure 1). Area temperature varies widely from one season to another and also between day and night [14]. Gahar Lake is situated at 2400 m above the sea level. It is a freshwater lake with about 100 ha vastness, 2.5 km length and 500 m width with a maximum depth of 28 m. The lake is a protected area and is located at latitude and longitude coordinates of 33° 18' 23" N and 49° 17' 2" E. Gahar Lake is principally fed by upstream waters during periods of heavy flow; in addition there are a few small springs at the lake bottom [15]. The maximum temperature of the region is 37°C in August and the minimum is -30°C in February. The average rainfall over a year is 700 mm, 72.3 % of which is during autumn and winter and in the form of solid [16].

Correspondence: Rouhollah Valipour Nouroozi

Department of Parasitology, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Golestan Hwy., Ahvaz, Iran, 1579461357.

Email: mvn1365@yahoo.com

Tel: +98 (916) 5846379 **Fax:** +98 (61) 33332036

Collection of snails. Sampling was done at ten localities around Gahar Lake in April, 2015 (Figure 1 and Table 1). Sampling took thirty min for each site [3]. The snails were collected by hand [4]. The samples were placed in plastic containers containing 70% ethyl alcohol and brought back to the laboratory [17]. The samples were washed with water to remove debris and soft parts [18]. The shells were dried at room temperature and kept up in plastic containers [18].

Identification of snails. Snail species were identified according to shell morphology [19, 20].

Statistical analysis. Presence of the detected snail species in each sampling site of Gahar Lake was determined descriptively.

RESULTS

Medically important snails were found in all ten sampling sites. H sampling site, with four species had the highest species diversity. The minimum species diversity in all sites was two (B and G Sites). Six species were identified overall (Figure 2). The frequency of each snail according to the number of sampling sites where they were detected is shown in Table 2. In this study, four snails with medical importance including; *Lymnaea truncatula*, *Lymnaea peregra*, *Melanoides tuberculata* and *Melanopsis* spp. were detected. Furthermore, in the current research *M. tuberculata* (seen in 10 sampling sites) was most distributed snail in all sampling sites.

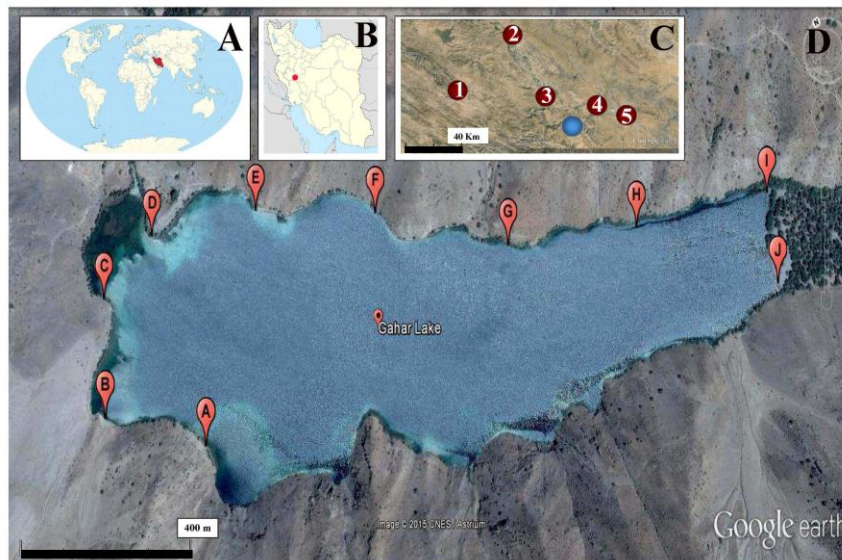


Fig. 1. Study area and sampling sites; Iran position in world map (A), position of Lorestan province (red dot) in Iran map (B), position of Gahar Lake (blue circle) in Lorestan province; red circles are cities of Lorestan province (1. Khorramabad; 2. Borujerd; 3. Doroud; 4. Azna; 5. Aligudarz) (C), sampling sites (red balloons) (D) [21, 22].

Table 1. GPS coordinates of each sampling site of Gahar Lake in Lorestan Province

Sampling sites	GPS coordinates (Latitude/Longitude)
A	33° 18' 23.07" N/ 49° 16' 35.41" E
B	33° 18' 28.82" N/ 49° 16' 26.59" E
C	33° 18' 36.37" N/ 49° 16' 29.78" E
D	33° 18' 38.40" N/ 49° 16' 36.50" E
E	33° 18' 35.38" N/ 49° 16' 47.85" E
F	33° 18' 29.83" N/ 49° 16' 59.71" E
G	33° 18' 22.27" N/ 49° 17' 11.86" E
H	33° 18' 17.77" N/ 49° 17' 25.38" E
I	33° 18' 14.15" N/ 49° 17' 39.90" E
J	33° 18' 8.45" N/ 49° 17' 37.01" E

Table 2. Distribution of snails in sampling sites of Gahar Lake

Snails	Sampling sites	Number of sampling sites
<i>Physa acuta</i>	A, E, F, G, H	5
<i>Planorbis intermixtus</i>	D, C, I, J	4
<i>Lymnaea peregra</i>	A, F, H	3
<i>Lymnaea truncatula</i>	E, H	2
<i>Melanoides tuberculata</i>	A, B, C, D, E, F, G, H, I, J	10
<i>Melanopsis</i> spp.	B, C, D, I, J	5

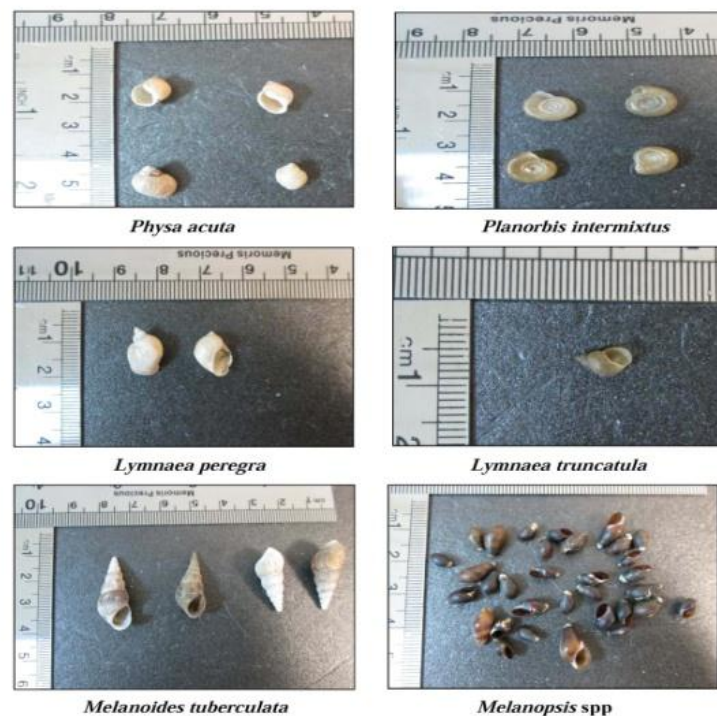


Fig. 2. Snails of Gahar Lake in Lorestan Province

DISCUSSION

Presence of medically important snails in Gahar Lake may be a danger to visitors of the lake. In the current study, *P. acuta* was detected in Gahar Lake which is in agreement with study of Mowlavi *et al.* in Khuzestan, Iran [23]. Ektefa *et al.* have found three species of *Planorbis* in Dez River, Iran [10] while in the present study only *P. intermixtus* was identified. The current study, has found two species of *Lymnaea* including *L. peregra* and *L. truncatula*. Mowlavi *et al.* in Khuzestan [23] has observed two species of *Lymnaea* too. Meanwhile, Ektefa *et al.* in Khuzestan province of Iran have identified five species of *Lymnaea* [10]. None of the mentioned studies in Iran have detected *L. peregra*. In addition, *L. peregra* could be the host for causative agents of *Cercarial Dermatitis* [24]. Mowlavi *et al.* in Khuzestan province have seen *M. tuberculata* in their investigation, too [23]. While Ektefa *et al.* have detected *Melanoides pyramis* in addition to *M. tuberculata* [10]. Mowlavi *et al.* in Khuzestan, Iran have also found a species of *Melanopsis* [23], while Ektefa *et al.* have identified five species of *Melanopsis* [10]. The species names of *Melanopsis* spp. wasn't determined in the present study since it is a difficult genus and is subject to considerable controversy and more specifically because of discrepancies between morphological and molecular analyses. In current survey, *M. tuberculata* have the highest abundance (seen in all sites) which is in accordance with studies by Ektefa *et al.* [10], Afshan *et al.* in Pakistan [3], Kebapci *et al.* in Turkey [20], Kucharz and Spyra *et al.* in Poland [19, 25]. In addition, *L. truncatula* have the lowest abundance (seen only in two sites) in present study, which correlates with the study of Mowlavi *et al.* [23] but does not correlate with the study of Ektefa *et al.* [10]. The difference in detected snail

genera in sampling sites with other literatures may be due to various physicochemical factors such as temperature, hardness, pH, seasonal changes, topography, chemical composition, vegetation, pollution and size of waterbodies [18, 3]. *L. peregra* and *L. truncatula* act as intermediate hosts of the well-known parasite, *Fasciola hepatica*. Humans are accidental hosts in the life cycle of this parasite. It is reported that 2.5 million people have been infected in 61 countries [26]. Some parasitic diseases that *M. tuberculata* is their intermediate host include *Heterophyiasis*, *Cercarial Dermatitis* and *Echinostomiasis*. The humans could be infected with mentioned diseases [27]. *Heterophyid* cercariae were detected in *Melanopsis* spp. in a study in Khuzestan province of Iran [28]. *Heterophyid* trematodes act as the causative agent of *Heterophyiasis* and have been reported in Khuzestan province [28]. In addition, in the mentioned study, *Echinostomatid cercariae* also were detected [28]. *Echinostomatid cercariae* are able to infect birds or mammals, including humans as definitive hosts [28]. The identification of medically important snails helps to control them [29]. In the present study, shells were used for identification of snail species and it was a limitation. It is suggested to utilize new techniques based on polymerase chain reaction to correctly identify medically important snails and their parasitic contamination.

ACKNOWLEDGEMENT

The author would like to express gratitude to Mr. A Karimi, Mr. B Mohammadi, Mr. S Taghizadeh, and Mr. J Quintero for their substantial contributions. In addition, the anonymous reviewers are gratefully acknowledged for their valuable comments.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest associated with this manuscript.

REFERENCES

1. Resh VH. Vector-borne diseases of freshwater habitats. Likens GE, editor. Encyclopedia of Inland Waters. Oxford: Academic Press; 2009; 129-37.
2. Sharma KK, Bangotra K, Saini M. Diversity and distribution of Mollusca in relation to the physico-chemical profile of Ghomanhasan stream, Jammu (J & K). *Int J Biodivers Conserv*. 2013; 5 (4): 240-9.
3. Afshan K, Azhar BM, Ahmad I, Ahmad MM, Qayyum M. Freshwater Snail Fauna of Pothwar Region, Pakistan. *Pakistan J Zool*. 2013; 45 (1): 227-33.
4. Barkia H, Barkia A, Yacoubi R, Guamri Y, Tahiri M, Kharrim KE, Belghyti D. Distribution of Fresh-Water Mollusks of the Gharb Area (Morocco). *Environments*. 2014; 1 (1): 4-13.
5. Hussein MA, Obuid-Allah AH, Mahmoud AA, Fangary HM. Population dynamics of freshwater snails (Mollusca: Gastropoda) at Qena Governorate, Upper Egypt. *Egypt Acad J Biolog Sci*. 2011; 3 (1): 11 -22.
6. Bdir S, Adwan G. Larval stages of digenetic trematodes in *Melanopsis praemorsa* snails from freshwater bodies in Palestine. *Asian Pac J Trop Biomed*. 2011; 1 (3): 200-4.
7. Madsen H, Hung NM. An overview of freshwater snails in Asia with main focus on Vietnam. *Acta Trop*. 2014; 140 (1): 105-17.
8. Guo YH, Lv S, Gu W, Liu HX, Wu Y, Zhang Y. Species composition and distribution of medical mollusca in Shanghai City. *Zhongguo Xue Xi Chong Bing Fang Zhi Za Zhi*. 2015; 27 (1): 36-40 [In Chinese].
9. Athari A, Gohar-Dehi S, Rostami-Jalilian M. Determination of definitive and intermediate hosts of cercarial dermatitis-producing agents in northern Iran. *Arch Iran Med*. 2006; 9 (1): 11-5.
10. Ektefa Z, Ahmadi E, Shamohammadi F. Identification Snails of Dez River in Khuzestan Province and Introduction Two New Records from Iran. *Exp anim biol J Payame Noor University*. 2013; 2 (3): 51-62 [In Persian].
11. Moghadam AS, Chegini AH. Parasitologic and Ecological study on *Melanoides* snails (Gastropoda) in Bandar Abbas district, Hormozgan, Iran. *Biomonth J Hormozgan U Med Sci*. 2009; 13 (1): 1-5 [In Persian].
12. Glöer P, Pešić V. The freshwater snails (Gastropoda) of Iran, with descriptions of two new genera and eight new species. *Zookeys*. 2012; 219: 11-61.
13. Gahar Lake. The Geological Survey of Iran. [Homepage of internet]. 2015. Available from: http://geotourism.gsi.ir/Main/-Lang_en/Page_21/PhenomenonId_116/StateId_65/Action_Phenomenon/Gahar.lake.html [cited 2015 July 1].
14. Enchanting Gahar Lake. IRIB English Radio. [Homepage of internet]. 2012. Available from: <http://english.ibrb.ir/radioculture/iran-/geography/item/147521-enchanting-gaharlakes> [cited 2015 July 1].
15. Ramin M, Doustdar M, Owfi F, Lakzaie F. Ichthyofauna of Gahar Lake and Gahar River, Lorestan Province, Iran. *Iran J Fisheries Sci*. 2014; 13 (4): 886-94.
16. Yarahmadi A, Moghimi E, Servati M, Kardavani P. Geomorphologic Evidences of the Influence of Glacier Sediments in Lake Formation Case Study: the Formation of Gahar Lake, in Iran. *Intl Res J Appl and Basic Sci*. 2012; 3 (2): 224-33.
17. Zuhair M, Shammari A. Terrestrial snails of Ha'il region, Saudi Arabia. *Int J Curr Sci*. 2013; 5 (1): 1-5.
18. Shahabuddin M, Panezai A, Nawaz Y, Iqbal A. First record of fresh water snails *Melanoides tuberculata* from different regions of Balochistan province, Pakistan. *Sci Int (Lahore)*. 2012; 24 (1): 87-9.
19. Kucharz AM. The occurrence and distribution of freshwater snails in a heavily industrialised region of Poland (Upper Silesia). *Limnologia*. 2008; 38 (1): 43-55.
20. Kebapci U, Yildirim MZ. Freshwater snails fauna of lakes region (Goller bolgesi), Turkey. *Muzeul Olteniei Craiova*. 2010; 26 (2): 75-83.
21. Iran location map. Wikimedia Commons. [Homepage of internet]. 2014. Available from: https://commons.wikimedia.org/wiki/File:Iran_location_map.svg [cited 2015 July 1].
22. Gahar Lake. Google Maps. [Homepage of internet]. 2015. Available from: <https://www.google.com/maps/@33.3030342,-49.2848113,3882m/data=!3m1!1e3> [cited 2015 July 1].
23. Mowlavi G, Mansoorian AB, Mahmoodi M, Pourshojaei R, Salehi M. Identification of freshwater snails in cane-sugar fields in the northern part of Khuzestan Province from a public health perspective. *J Sch Public Health Inst Public Health Res*. 2009; 7 (1): 69-76 [In Persian].
24. Dolecková K, Kasný M, Mikes L, Mutapi F, Stack C, Mountford AP, Horak P. Peptidases of *Trichobilharzia regenti* (Schistosomatidae) and its molluscan host *Radix peregra* S. Lat. (Lymnaeidae): construction and screening of cDNA library from intramolluscan stages of the parasite. *Folia Parasitol (Praha)*. 2007; 54 (2): 94-8.
25. Spyra A, Serafinski W, Strzelec M. The species diversity of freshwater snails in differently managed fish ponds in south-western Poland. *Ekologia (Bratislava)*. 2007; 26 (1): 83-9.
26. Moghadami M, Mardani M. *Fasciola hepatica*: a cause of obstructive jaundice in an elderly man from Iran. *Saudi J Gastroenterol*. 2008; 14 (4): 208-10.
27. Farahnak A, Setodeh S, Mobedi I. A faunistic survey of cercariae isolated from *Melanoides tuberculata* and their role in transmission diseases. *Arch Razi In*. 2005; 59 (1): 113-9.
28. Farahnak A, Darian RV, Mobedi I. A Faunistic Survey of Cercariae from Fresh Water Snails: *Melanopsis* spp. and their Role in Transmission Diseases. *Iran J Public Health*. 2006; 35 (4): 70-4.
29. Pokora Z. Role of gastropods in epidemiology of human parasitic diseases. *Wiad Parazytol*. 2001; 47 (1): 3-24 [In Polish].