

Prevalence and Ecology of Fresh Water Snails in Some Selected Districts of Southern Punjab, Pakistan

Ghulam Murtaza Arshad, Azhar Maqbool, Muhammad Fiaz Qamar^{1*}, Syed Muhammad Hussan Bukhari, Haji Ahmad Hashmi and Muhammad Ashraf

Department of Parasitology, University of Veterinary & Animal Sciences, Lahore-Pakistan

¹University College of Veterinary & Animal Sciences, The Islamia University of Bahawalpur-Pakistan

Abstract

Snails (*Gastropoda*) act as intermediate hosts of various species of trematodes (Platyhelminthes: Trematoda) infecting livestock and human populations. Various species of snails which act as the intermediate host of the Schistosomes were collected from the study area. A total of 10418 snails were collected of these 13.51% were found to be infected. Only 14.51% of 2350 snails collected from district Kasur were infected followed by 13.6% of 2882 from district Sheikhpura, then 13.4% of 2709 from district Sargodha and the lowest 12.51% of 2477 from district Lahore.

Key words: Ecology, Snails, Punjab-Pakistan.

Introduction

Snails act as the intermediate host for the spread of the parasitic infestation of the animals, birds, man and fishes. The involvement of snails for the transmission of fasciolosis, Schistosomiasis and other trematode infections in buffalos and cattle is reported by Kandel (1954). In the snails, the stages of the life cycle are completed i.e. sporocyst and cercariae. For the development of snails, ideal environmental condition exists in Pakistan. Utilization of rivers as sources of irrigation water and geoclimatic conditions of the Punjab play an important role in the dissemination of these snails. In Pakistan many researchers conducted studies on different fresh water snails in different parts of the country were carried out Akhtar and Khan (1989); Akhtar (1990); Buriro and Chaudhry (1981); Mughal (1993); Parveen (1977) and Sarwar (1949) (1953) but no work has been done on seasonal incidence of various snails. Thus it was thought necessary to determine the

***Corresponding Author:** Muhammad Fiaz Qamar, University College of Veterinary & Animal Sciences, The Islamia University of Bahawalpur-Pakistan

Email: fiazqamar1@yahoo.com

effecting the populations of the fresh water snail. The meteorological data temperature and rain fall play very important role in the spread of disease. The ideal temperature ranges from 22-25 °C where development within snail takes place in an efficient manner similarly humidity ranges from 55-70% is ideal for the development of the snail and the parasite. Rainfall is very important for the spread of the disease.

Materials and Methods

The study was designed to record the prevalence of various species of snails over a period of one year i.e. from December 2005 to November 2006 in the different districts of Punjab province i.e. Sargodha, Sheikhpura, Lahore and Kasur which belong to same agroecological zones of southern Punjab to understand detailed incidence and trends of snail populations during an year. All snails were examined for the presence of cercariae. For the identification of infected snails with intermediate stages of Trematodes, the methods used for this study is detailed as under.

Collection of Snails

The samples were collected by using scoop net, which consisted of a metal ring of 36 cm length and 30 cm diameter attached to a wire net of 16 meshes per inch. The metal ring can easily be connected to a metal handle comprising of sectional pipes, each 35cm long which can be joined to each other by a screw to give a total length of 2.45 meters Urquhart et al. (2001). The snails along with some of the water vegetation were brought in small polythene bags to the laboratory on the same day. In the laboratory they were kept in the large beakers which were constantly aerated. Aquatic vegetation such as *Hydrilla verticillata*, *Vallisneria spiralis* were placed in the large beakers to keep the water clean for a longer period.

Identification and Examination of Snails

The snails were washed thoroughly in running water or still water and cleaned from mud, debris and ciliates. They were classified according to the shell morphology as described by El-Gindy (1960) and Malek (1984). To examine the snails for infection for

trematode they were isolated either in four specimen tubes for 24 hours. The water of these tubes was examined against the light, with naked eye or with a hand lens, after every hour during the day and on the following. The infected snails were segregated from the rest as described by El-Gindy (1960) and Malek (1984).

Results and Discussion

The snails were collected from all the four some selected districts of southern Punjab, Pakistan i.e., from Sargodha, Sheikhpura, Lahore and Kasur. It was also noted that there was a definite pattern of monthly and seasonal incidence and degree of infection that varied considerably in snails of some genera which have been collected from different areas of the Punjab province. From the study districts, 13.51% (1407 out of 10418) were found to be infected. The rate of infection was the highest in district Kasur 14.51% (341 out of 2350) followed in order by district Sheikhpura 13.6% (392 out of 2882) then district Sargodha 13.4% (364 out of 2709) and the lowest at district Lahore 12.51% (310 out of 2477) (Table 1). At Kasur district, *Oncomelonia*, *Indoplanorbis* and *Bulinus* are the genera with the prevalence of 31.79%, 17.10% and 14.46%, respectively. However, the highest number of the snails was collected belonging to the genera *Indoplanorbis* (Table 1). At Sheikhpura district, genus wide prevalence of snail indicated that *Bulinus*, *Lymnaea*, *Indoplanorbis* and *Physa* are the four prominent snails with infection rate of 24.74, 20.57, 14.66 and 13.84 percent respectively (Table 1). At Sargodha district, genus wise prevalence of snails indicated that *Lymnaea*, *indoplanorbis* *Bulinus* and *Physa* are the four prominent snails with infection rate of 25.09, 14.29, 14.28 and 16.77 per cent respectively (Table 1). At Lahore district, genus wise prevalence of snails indicated that *Bulinus* *Lymnaea*, *Physa* and *Indoplanorbis* are the four prominent snails with infection rate of 23.37, 18.96, 13.97 and 12.70 per cent respectively. Various workers from various parts of the world collected snails and the infection rate in them is nearly similar to that of the present study i.e., Gill (1985), Yuan et al. (2003), Irshad (1998), Seto et al. (2001), Chingwena et al. (2002), Curtis et al. (2004), Mavenyengwam et al. (2006) and Phiri et al. (2007). It is evident from the results that there was direct relationship between the prevalence of snails and the infection rate of trematodes.

District wise prevalence of snails indicated that the highest (14.51%) prevalence was reported at Kasur followed by Sheikhpura (13.60%), Sargodha (13.40%) and the lowest at Lahore (12.51%). Gill (1985) reported that there were well drained areas of

Lahore and Kasur. Around Kasur there were enough marshy areas which favor the development of snails and the incidence of trematodes was high in flooded pasture than plain. Yapi et al. (2004); (2005) reported that irrigation canals increased the incidence. Pfukeni et al. (2005) reported that prevalence of snails in different locations of the country was different. This was due to difference in the environmental and managerial conditions. Gill (1985); Tanveer (1990a), Yuan et al. (2003), Irshad (1998), and Rondelaud et al. (2007) also reported similar findings. The highest prevalence at Kasur district indicated that at Kasur the environmental conditions are more suitable for the snails breeding. As there are many lakes, streams and the River so there was high occurrence of snails at this district. This was also correlated with the meteorological factors associated with the disease pattern. Gill (1985); Irshad (1998); De kock and Wolmarans (2005) and Stengaard et al. (2006) also reported similar results. The most important and heavily infected snails were *Bulinus* (19.89%), *Lymnaea* (19.12%), *Physa* (18.75%) and *Indoplanorbis* (14.48%). Some workers from different countries of world reported similar results i.e., Stengaard et al. (2006) and Sri-aroon et al. (2007). They have found that *Bulinus* and *Lymnaea* are the most heavily parasitized snails in the locality surveyed. There are two periods of high incidence of cercarial stage during July–August and September–October. Burrero and Chaudhry (1981); Tanveer (1990b) have recorded their observations on *Lymnaea*, *Indoplanorbis* and *Bulinus* snails they reported that there are two periods of peaks in a year. The lowest incidence tends to occur in winter when the maximum temperature ranges from 13.5 – 21.6°C and extreme minimum temperature is from 4.7–8.3 °C. In the present study *Indoplanorbis* predominated in autumn, decreased in summer then followed by winter and the lowest during spring. The peak incidence of *Bulinus* was recorded during summer 9.90%, followed by spring 9.58% and lowest during winter 6.57%. Mavenyengwam et al. (2006) and Phiri et al. (2007) reported seasonal distribution of *Bulinus* in spring and autumn. The peak infection 9.90% in summer was due to the results of the maturation of immature stages as the temperature rises. During the late summer a large number of mature snails oviposit and die consequently and gradually fall down. As the summer merges into rainy season there was found an increase in snail's population during autumn Yuan et al. (2003). In the present study snails were found to reach their maximum incidence during summer and autumn providing optimum temperature required for their breeding and reproduction. These results were in agreement with Tanveer (1990a).

Table 1 District wise prevalence of various snails in Punjab Province

District	Parameters	Lymn	Indo	Buli	Phy	Gyr	Bella	Onco	Overall
Lahore	Collected	232	958	154	408	247	249	229	2477
	Infected	44	118	36	57	24	7	24	310
	% Infection	18.96	12.7	23.37	13.97	9.71	2.01	10.48	12.51
Sargodha	Collected	249	1014	196	459	270	272	249	2709
	Infected	64	145	28	77	22	1	27	364
	% Infection	25.09	14.29	14.28	16.77	8.14	0.33	10.84	13.4
Sheikhupura	Collected	277	881	291	457	308	308	360	2882
	Infected	57	122	72	67	22	3	49	392
	% Infection	20.57	13.84	24.74	14.66	7.14	0.97	13.61	13.6
Kasur	Collected	282	918	159	357	213	204	217	2350
	Infected	35	157	23	39	16	2	69	341
	% Infection	12.41	17.1	14.46	10.92	7.51	0.98	31.79	14.51
Overall	Collected	1040	3742	799	1281	1038	1033	1055	10418
	Infected	200	542	159	240	84	13	169	1407
	% Infection	19.12	14.48	19.89	18.75	8.09	1.25	16.01	13.5

Buli: *Bulinus*, Lymn: *Lymnaea*, Indo: *Indoplanorbis*, Phy: *Physa* Onco: *Oncomelonia*, Gyr: *Gyraulus*, Bella: *Bellamaya*

Table 2 Mean Month wise Temperature (°C), Humidity (%), Rainfall (mm) and Pan Evaporation (mm/24 hours) during Dec. 2005 to Nov.2006

Months	Temperature		Relative Humidity		Rainfall (mm)	Pan Evaporation (mm)
	Min	Max	Morning	Evening		
Dec,2005	7	21.6	82	45	0	7
Jan,2006	8.4	19.7	75	50	18.9	2.3
Feb,2006	14.7	26.7	76	44	4.9	2.35
Mar,2006	16.1	26.8	68	43	42.1	5
Apr,2006	22.7	35.7	39	20	-1	7.35
May,2006	27.4	39.5	51	28	22.4	7.7
Jun,2006	26.8	37.8	52	32	87.9	8.2
July,2006	27.6	35	76	61	185.5	5.1
Aug,2006	26.9	34.1	79	67	147.7	3.86
Sep,2006	24.9	33.2	76	57	157.6	4.74
Oct,2006	21.6	31.6	74	49	46	3.8
Nov,2006	16.1	26	81	55	9	2.1
Average	20.01	30.63	69.08	45.91	60.08	4.51

This is because high temperature may decrease survival of cercariae (Ferrel *et al.* 2001; De Kock and Wolmarans, 2005; Rondelaud *et al.* 2007).

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