

Research Article

**PREVALENCE OF TREMATODE INFECTION IN *LYMNAEA LUTEOLA*
AND *INDOPLANORBIS EXUSTUS* IN DIFFERENT HABITATS**

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ABSTRACT

Molluscs are responsible for transmitting important fluke infections to human beings as well as to their domestic animals, therefore study was conducted to see the influence of seasons and nature of habitats on prevalence of trematode infection in *Lymnaea luteola* and *Indoplanorbis exustus*. A group of 10 to 15 snails of the same species and of the same water source were placed in a small beaker containing 50ml of stored tap water. Water was examined for presence of any cercariae under a stereoscopic microscope. Results reveal that season has influenced on prevalence of the snails with regard to trematode infections as summer season was recognized with lowest number of positive snails. Between the two snail's species, *I. exustus* showed highest prevalence reaching to 13.62% in the month of October. In contrast to *L. luteola*, a small percentage of *I. exustus* (1.88%; 1.28%) remained positive for trematode infection in the months of May and June. In the marshyland prevalence of positive snails was much higher in comparison to the ponds. During the same months, *I. exustus* showed 35.61% and 13.74% positivity, respectively. The snails present in paddy fields remained negative for any trematode infection throughout our study. Among the trematode infections, cercariae of mammalian schistosome were higher in number than other trematode infections. The positive snails reached to their peak in the month of September or October at the end of rainy season and just start of winter but turned negative in the months of May and June.

Key Words: Trematode, *Lymnaea luteola*, *Indoplanorbis Exustus*, Habitats

INTRODUCTION

Molluscs are responsible for transmitting important fluke infections to human beings as well as to their domestic animals. Schistosomiasis is one of the major helminthic diseases of the human beings. The Fasciolosis, Amphistomiasis, Clonorchosis, Paragonimiasis are other examples which are affecting all kinds of animal population. The investigations made by various Indian workers have suggested that *Indoplanorbis exustus* and *Lymnaea luteola*, are responsible for transmitting almost 90% trematode infection related to man or domestic animals. The seasonal variation in positivity of the snails has been reported by various workers (Dutt and Bali 1980, Dasmahapatra 1982, Gogoi and Sarma 1986, Kohli and Agrawal 1995, Mishra and Agrawal 1998, Agrawal *et al.*, 2000). The present study helps in identifying the importance of paddy field, low lying areas, marshy land, perennial ponds in sustaining snail population and their importance in transmitting fluke infection.

MATERIALS AND METHODS

For the present study, twelve sampling stations located in and around Jabalpur district were fixed i.e., two perennial ponds, two marshy land, two paddy fields, two water pools and four water ditches. A group of 10 to 15 snails of the same species and of the same water source were placed in a small beaker containing 50ml of stored tap water (Agrawal, 1995). The snails were exposed in the morning to artificial light for two to three hours. Water was examined for presence of any cercariae under a stereoscopic microscope (Agrawal *et al.*, 2000). Snails from the groups, which were positive by the above procedure, were

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separated individually into small specimen tubes containing stored water and further exposed to the light to identify individual positive snail.

The identification of non-furcocercous cercariae from furcocercous cercariae was done on the basis of shape of the tail in former case it was simple while in latter case it was forked. Further identification of non-furcocercous cercariae was done with the description provided by cable (1963). With regards to furcocercous cercariae, they are of two types. One has forked part of the tail as long as the stem (streigeidae) while in other type the stem is longer than the forked part of the tail (schistosomatidae).

(A) Mammalian schistosome cercariae were identified on following grounds (Agarwal *et al.*, 1991; Kohli and Agrawal, 1995) (i) Snail species shedding the cercariae; (ii) Behavior of cercariae in the water; (iii) Morphology of the cercariae;

- *S. incognitum* were seen to concentrate on water surface with their head hanging down words with broad tip.
- *O. dattai* cercariae were equally distributed in the water. The tip was absent in *O. dattai*.
- *S. spindale*. They are larger in size and their tip of the ramai was elongated.
- *S. indicum*. They are smaller in size having square shaped tip.
- Amphistome cercariae were identified being dark brown in color and possessing ventral sucker at or very near to the posterior extremity.

RESULTS AND DISCUSSION

The season has influenced positivist of the snails with regard to trematode infections as summer season was recognized with lowest number of positive snails. Between the two snail's species, *I. exustus* showed highest positivity reaching to 13.62% in the month of October. Incontrast to *L. luteola*, a small percentage of *I. exustus* (1.88%; 1.28%) remained positive for trematode infection in the months of May and June. The highest percentage of *L. luteola* was 11.45% in the month of November, which turned to 0.0% in the month of May and June. In the marshyland percentage of positive snails was much higher in comparison to the ponds. Here, *L. luteola* showed highest trematode infections (42.66%, 45.31%) during the months of September and October. During the same months, *I. exustus* showed 35.61% and 13.74% positivity, respectively. In the marshyland higher percentage of positive snails were observed in the winter season, in comparison to the ponds. Positive *L. luteola* were quite high reaching to 32.0 % in water pool' whereas positivity of *I. exustus* was 26.92 % in the same habitat. Comparatively a higher number of *I. exustus* were positive in the water pools and ditches. The snails present in both paddy fields remained negative for any treamtode infection throughout our study. Among the trematode infections, cercaria of mammalian schistosome were higher in number than other trematode infections. The positive snails reached to their peak in the month of September or October at the end of rainy season and just start of winter but turned negative in the months of May and June. The seasonal variation in positivity of the snails has been reported by various workers (Agrawal and Dutt1974, Dutt and Bali 1980, Dasmahapatra *et al.*, 1982, Gogoi and Sarma 1986, Kohli and Agrawal 1995, Amanullah and Hameed 1996, Mishra and Agrawal 1998, Agrawal *et al.*, 2000). While various workers (Dutt and Bali 1980, Dasmahapatra *et al* 1982, Gogoi and Sarma 1986, Kohli and Agrawal 1995, Mishra and Agrawal 1998, Agrawal *et al.*, 2000) have reported two to four percent *L. luteola* or *I. exustus* being positive for schistosome cercariae, a higher positiveness was observed in the present study. There was also a great fluctuation in positive snails during the same month. The same observation has also been made by Agrawal *et al.*, (2000) where all snails collected in the month of August, were negative for schistosome cercariae. However 13% snails of the same pond, collected only two days later, were shedding schistosome cercariae. Therefore Agrawal *et al.*, (2000) suggested that prevalence of Schistosome cercariae in *L. luteola* was not only seasonally affected but there were other factors also which were determining positiveness of the snails.

The snails, recovered from two paddy fields, were found negative for any trematode cercaria. It may be mentioned that there was no pond surrounding the paddy fields, hence it is difficult to claim that the snails remained negative in the paddy fields in spite of their possessiveness in the surrounding ponds. The snails

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of paddy field might be negative for schistosomes or amphistomes due to no entry of domestic animals in the ignited fields (these fields were demarcated with mud walls which have also prevented entry of the animals). However it is surprising why these snails remained negative for avian schistosome cercariae or for other fluke cercariae which may be a part of avian trematodes. Obviously, more work is needed in this aspect. Water pools and ditches were the temporary sources of water, which dried up in the summer season. Nevertheless, positivity of the snails in the water pools and ditches suggesting their importance in transmitting fluke infections during rainy season. One reason for such a high positivity of the snails to fluke infections may be a very small area of the ditches and water pools where faecal contamination was capable of infecting all the snails present during that time. This has well been demonstrated by Agrawal (1999) by infecting a large proportion of *L.luteola* in artificially prepared cement pond by adding 160 gm of pig faeces, positive for *S.incognitum* eggs. The percentage of positive snails in the marshy lands was again higher than that of the ponds (Table 1).

Table 1: Prevalence of trematode infections in *Lymnaea luteola* and *Indoplanorbis exustus* in different habitats.

Month		Ponds	Marshy Land	Paddy Field	Water Pool	Ditches
JAN	<i>L.luteola</i>	114/6 (5.26)	47/7 (14.89)	-	-	-
	<i>I.exustus</i>	162/8 (4.93)	77/9 (11.68)	-	-	-
FEB	<i>L.luteola</i>	115/8 (6.95)	30/4 (13.33)	-	-	-
	<i>I.exustus</i>	153/6 (3.92)	54/14 (25.92)	-	-	-
MAR	<i>L.luteola</i>	82/7 (8.53)	27/2 (7.40)	-	-	-
	<i>I.exustus</i>	130/8 (6.15)	50/8 (16.00)	-	-	-
APR	<i>L.luteola</i>	90/4 (4.44)	19/0(00)	-	-	-
	<i>I.exustus</i>	155/7 (4.51)	37/2 (5.40)	-	-	-
MAY	<i>L.luteola</i>	65/0(00)	20/2 (10.00)	-	-	-
	<i>I.exustus</i>	106/2 (1.88)	27/1 (3.70)	-	-	-
JUNE	<i>L.luteola</i>	49/0(00)	16/3 (18.75)	-	-	-
	<i>I.exustus</i>	78/1 (1.28)	29/6 (20.68)	-	-	-
JULY	<i>L.luteola</i>	187/16 (8.55)	28/3 (10.71)	35	14/4(28.57)	21/0(0.00)
	<i>I.exustus</i>	201/19 (9.45)	52/12 (23.07)	34	34/0(0.00)	32/2(6.25)
AUG	<i>L.luteola</i>	233/22 (9.44)	60/16(26.66)	31	22/7(31.80)	15/4(26.66)
	<i>I.exustus</i>	271/27 (9.96)	64/17 (26.56)	60	39/4(10.25)	42/21(50.00)
SEP	<i>L.luteola</i>	292/15 (5.13)	75/32 (42.66)	44	25/8(32.0)	33/7(21.21)
	<i>I.exustus</i>	329/36 (10.94)	73/26(35.61)	68	26/7(26.92)	37/16(43.24)
OCT	<i>L.luteola</i>	299/29 (9.69)	64/29 (45.31)	41	18/4(22.22)	00(0.00)
	<i>I.exustus</i>	367/50 (13.62)	131/18 (13.74)	50	30/1(3.33)	00(0.00)
NOV	<i>L.luteola</i>	131/15 (11.45)	54/9 (16.66)	05	00(0.00)	00(0.00)
	<i>I.exustus</i>	180/10 (5.55)	83/5 (6.02)	04	11(0.00)	00(0.00)
DEC	<i>L.luteola</i>	118/8 (6.77)	47/9 (19.14)	-	-	-
	<i>I.exustus</i>	162/8 (4.93)	100/11 (11.00)	-	-	-
TOTAL (%)	<i>L.luteola</i>	1775/130(7.32)	487/116(23.81)	156	79/23(29.11)	69/11(15.94)
	<i>I.exustus</i>	2294/182 (7.93)	777/129 (16.60)	216	140/12(8.57)	111/39(35.13)

Note: Values shown in table are total snails / infection positive snails, values in parenthesis are percentage of infection.

The present results are providing explanation why fluke infections increase many folds during rainy season, when, all water sources, beside perennial ponds, also contained fresh water snails, which is not

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the case during other seasons. As ponds are perennial in nature, they are also responsible for spreading trematode infections through out the year. Nevertheless, importance of marshy lands and water pools in spreading fluke infections during rainy season cannot be under estimated. It is true that marshy lands contain a lower number of snails per square meter but whole area is widely covered by the ruminants for grazing due to presence of grasses all over the marsh land. More over, in the marshy lands, the snails remain in the shallow water and many times attached on the grasses. Therefore, the cercariae are more concentrated near to these vegetables creating more chances of infecting the animals The stagnant water in the marshy lands is also drank by the animals thereby some times avoiding the need to visit the ponds.

SUMMARY AND CONCLUSION

Molluscans are responsible for transmitting infections and season has influence on it. Between the two snail's species, *I. exustus* showed highest positivist in the month of October. Incontrast to *L. luteola*, a small percentage of *I. exustus* remained positive for trematode infection in the months of May and June. In the marshyland percentage of positive snails was much higher in comparison to the ponds among the trematode infections, cercariae of mammalian schistosome were higher in number than other trematode infections. The positive snails reached to their peak in the month of September or October at the end of rainy season and just start of winter but turned negative in the months of May and June.

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