International Journal of Engineering, Science and Mathematics
Vol. 7 Issue 7, July 2018,
ISSN: 2320-0294 Impact Factor: 6.765
Journal Homepage: http://www.ijesm.co.in, Email: ijesmj@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

STUDY ON HOST-PARASITE RELATIONSHIP OF FRESHWATER SNAILS AND LARVAL TREMATODES OF MEERUT DISTRICT, UP

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ABSTRACT

Snail is known to serve as an intermediate host for several species of larval trematodes some of which are highly pathogenic for their second intermediate host i.e fishes. If we want the fisheries development programmes to be successful, we need to intensive research on the fish parasites and their intermediate host. These parasites also provoke remarkable mortality to human and cause serious damages to aquaculture, which is a valuable source of food and employment in developing countries, basically deals with the studies on effect of parasite i.e. cercariae that were found in various water bodies of Meerut region infecting the host *B. bengalensis* and *L.luteola*. Recent investigations have shown that some of the molluscs are sources of important bio medical compound. The World Health Organization (WHO) is therefore, paying special attention to this dynamic host-parasite interaction of larval trematodes and snail control. Although the effects of digenetic trematodes on their vertebrate hosts have been studied, comparatively little attention has been paid towards the host-parasite relationship between the larval trematodes and their molluscan hosts.

Keywords- Host, Parasite, Intermediate, Trematodes

Introduction:

Studies on host-parasite relationship of trematodes has been receiving much attention since last three decades. With very few exceptions molluscs serve as the only or as one of the intermediate hosts of the digenetic trematodes. Among this group of endoparasites, a number of species are of public health and veterinary importance, since they are known to cause debilitating diseases, with some being more severe than others. The World Health Organization (WHO) is therefore, paying special attention to this dynamic host-parasite interaction of larval trematodes and snail control. Although the effects of digenetic trematodes on their vertebrate hosts have been studied, comparatively little attention has been paid towards the host-parasite relationship between the larval trematodes and their molluscan hosts.

Irrespective of whether the mollusc is the intermediate, definite or only host in the developmental cycle of the parasite, one can expect to find pathological manifestations induced by the parasite. Such alterations from the normal can be appreciated as histopathological, physiological as well as biochemical changes. Although a large number of helminths have been reported as parasites of economically important molluscs all over the world, most of these do not appear to be lethal pathogens, nor do they cause mass mortalities, although histopathological changes are usually associated with Gymnocephalous cercaria and sporocysts of Schistosoma mansoni infections in snails Melanoidestuberculatus and Australorbisglabratus respectively. In heavy infections, the larval trematodes invade the reproductive system and other parts in addition to the digestive gland **Cheng and Cooperman, (1964); Cheng and Burton, (1965)**. In an extensive study **Cheng and Snyder (1962)** and **Cheng and Burton (1965)** have showed the effect of intra molluscan stages of Crepidostomumcornutum and Glypthelminspennsylvaniensis on the digestive glands of Sphaeriumstriatinum. Helisomatrivolvis and Crassostrea virginica reported the heavy infections of C.cornutum where the mother redia were found on the gills and daughter redia were in the digestive gland of S. striatinum. They also observed that the digestive gland was completely destroyed and the presence of cells of this organ in the caeca of several living daughter redia. **James (1965**) in an elaborated account illustrated the effects of parasitism by fine species of larval digenea on the digestive gland of the intertidal prosobranch, Littorina saxatilis tenebrosa. He stated that many digestive gland cells in L. saxatilis heavily parasitized with larval digenea undergo, exactly the same stages of autolysis as described in animals subjected to starvation. The major pathological and physiological effects of larval trematodes on the digestive gland of the host were extensively summarised by **Wright (1966a,b); Erasmus (1972); Smyth and Halton (1983); Kube, et al., (2006)** described a loss of fecundity in a population of mud snails Hydrobiaventrosa caused by larval trematodes. In general, they include vacuolisation of cell cytoplasm, karyolysis, mechanical damage of tubules and intertubular tissues and histolysis of tissues by excretory products of the larvae. Secondary effects such as release of pigments resulting from the destruction of gland are also common.

Material and Method:

A total of around 1000 freshwater snails were collected monthly during May, June, July, August and September from various water reservoirs ofMeerut region viz., Ram Taal Vatika, ChittoraPowerhouse, Die Shastri Nagar, Village Shobhapur, Village Kunda, KankerKhera near 510 Army Workshop, Bhola Power House, Pond near Railway Cant Station, Nanu Ki Nahar near Sardhana, Pond in village Rohta, Kali Nadi near Medical College, Ashram Pond in Parikshit Garh, Pond in Ganga Nagar near Hastinapur.

Snails were collected and identified by the method suggested by **Subba Rao (1989)**. The snails identified were found to be Bellamya bengalensis / wypioa (Lamarlo). Lymnaea (Pseudosuccina) luteola / typica (Lamark).

Collected snails were thoroughly washed in running tap water, arranged specieswise, counted and then kept in 5 to 10ml dechlorinated tap water in large specimen bottles (5 x 3 cm) and placed beneath either a light source for twenty-four hours or exposed daily in the morning sunlight for one hour. The snails were then kept in individual tubes. Individual tubes were then examined by a hand lens for shedding of cercarine as it stimulates the positively phototrophiecercarloe to come out of the infected snails. The snails which did not release cercariae were examined three times on alternate days as above and finally before discording them, were crushed between two glass slides and examined under a compound microscope to determine for the presence of larval trematodes and developing stages of cererise in the hepatopancreas. All the positive snails were maintained in the separate aquaria in dark corner of the room duly covered with black cloth. Pieces of calcium carbonate were added to aquaria.

Each snail that shed cercariae under these conditions was considered to have a patent infection. These snails were maintained in the laboratory in glass beaker and were fed a twig of Hydrilla plant of Spinacea oleracea or lettuce. Distilled water was used in initiating and keeping a constant water volume in the aquaria. The water of beaker was changed daily. The snails which on repeated examination were found negative of trematode infection were separated species wise and transferred into big glass jars, enamel basins or big earthen tube and maintained in the laboratory on boiled algae and on well washed aquatic plants.

Discussion and Results:

Cheng (1967) furnished a review of the effects of parasites on marine molluscs.**Porter, et al., (1967); Reader (1971); and Rohde and Sandland (1973)** carried out the host- parasite relationship of some species of larval digenea and their snail hosts. The relationship of larval stages of Fasciola hepatica and freshwater snail Lymnaeatruncatula was revealed by the studies of **Moore and Halton (1973)and Itagaki (1986)**.

Parasites lodge in the inter-tubular tissue of the host and cause tubule compression and increased cellular vacuolation together with lysosomal enzyme activity. The overall effect appears to be an increase in intracellular digestive processes including autolysis. **Mohandas (1974)** studied the pathological effect of larval trematodes on the digestive glands of four species of gastropods. Studies on the effect of parasitism on the inorganic metabolism include those of **Shaw and Erasmus (1987)** especially on the changes of calcium reserves following parasitism. In a sequence of studies **Yoshino (1976)** illustrated the histopathological effects of radiae of Euhaplorchiscalifornienssis and sporocyst of Renicolabuchanani on the digestive gland of marine prosobranch Cerithidea californica. He observed the changes in the digestive gland of C.californica such as disruption of digestive vacuoles, cell-cell junctions, the deformation of luminal microvilli, the lysis of distal plasma membranes and nuclear polymorphism. He found the reduction of epithelial height of digestive tubules when the snail was parasitized by R.

buchanani. This phenomenon has been reported previously by **Cheng and Snyder (1962)**. This morphological change can be attributed to the starvation of cells as the result of the blockage of the haemolymph channels by the parasites. **Yoshino (1976)** observed the capsule formation in response to R. buchanani sporocysts in Cerithidea californica. He considered it a type of leucocytic encapsulation, specifically designated as hyalinocytic encapsulation. Previously, **Cheng and Rifkin (1970)** gave a review on encapsulation of helminth parasites in molluscs.

In recent years the investigations of **Vasanda (2004)**revealed the relationship of Biomphalaria glabrata, Lymnaeastagnalis and Melanoidestuberculatus with the larval stages of Schistosoma mansoni, sporocysts and pleurolophocercous cercarial infections respectively. More recently histopathological changes in Lymnaea glabrata and the larval stages of F hepatica were studied **Bouix-Busson et al., (1985); Rondelaudet al., (1978)**observed the following changes: digestive gland with only 4-9 tubules and the tubular epithelium with irregular hyperplasia. These tubules of L.glabrata were surrounded by a granulomatous encapsulation process.

Conclusion:

Snails are known to serve as intermediate host for several species of larval trematodes, some of which are highly pathogenic for their second intermediate host i.e., fishes. The success of implementation of various fisheries development programmes depend to some extent on intensification of the fish parasitological research, as to the improvement of fish yield commonly be achieved from healthy fish stock.Parasitic infection affects the health of more than 40 million people throughout the world, and they are particularly prevalent in Asian countries. These parasites provoke remarkable mortality to human and cause serious damages to aquaculture, which is a valuable source of food and employment in developing countries.

References:

[1] Cheng, T. C., & Cooperman, J. S. (1964). Studies on host-parasite relationships between larval trematodes and their hosts. V. The invasion of the reproductive system of Helisomatrivolvis by the sporocysts and cercariae of Glypthelminspennsylvaniensis. *Transactions of the American Microscopical Society*, *83*(1), 12-23.

[2] Cheng, T. C., & Burton, R. W. (1965). Relationships betweenBucephalus sp. andCrassostrea virginica: Histopathology and sites of infection. *Chesapeake Science*, *6*(1), 3-16.

[3] Cheng, T. C., & Snyder, R. W. (1962). Studies on host-parasite relationships between larval trematodes and their hosts. I. A review. II. The utilization of the host's glycogen by the intramolluscan larvae of Glypthelminspennsylvaniensis Cheng, and associated phenomena. *Transactions of the American microscopical Society*, *81*(3), 209-228.

[4] Cheng, T. C., & Burton, R. W. (1965). Relationships betweenBucephalus sp. andCrassostrea virginica: Histopathology and sites of infection. *Chesapeake Science*, *6*(1), 3-16.

[5] Wright, C. A. (1966). Relationships between schistosomes and their molluscan hosts in Africa. *Journal of Helminthology*, *40*(3-4), 403-412.

[6] Erasmus, D. A. (1972). The biology of trematodes. *The biology of trematodes.*

[7] Smyth, J. D., & Halton, D. W. (1983). *The physiology of trematodes*. CUP Archive.

[8] Kube, S., Kube, J., & Bick, A. (2006). A loss of fecundity in a population of mudsnailsHydrobiaventrosa caused by larval trematodes does not measurably affect host population equilibrium level. *Parasitology*, *132*(5), 725-732.

[9] Porter, C., Pratt, I., &Owczarzak, A. (1967). Histopathological and histochemical effects of the trematode Nanophyetus salmincola (Chapin) on the hepatopancreas of its snail host, Oxytrema siliqua (Gould). *Transactions of the American Microscopical Society*, 232-239.

[10] Reader, T. A. (1971). The pathological effects of sporocysts, rediae and metacercariae on the digestive gland of Bithynia tentaculata (Mollusca: Gastropoda). *Parasitology*, *63*(3), 483-489.

[11] Rohde, K., &Sandland, R. (1973). Host-parasite relations in Lobatostomamanterirohde (trematoda: aspidogastrea). *Zeitschrift für Parasitenkunde*, *42*(2), 115-136.

[12] Itagaki, T. A. D. A. S. H. I., &Itagaki, M. (1986). Development of the Japanese liver fluke and pathological changes in the snail host Lymnaeatruncatula. *KisiichugakuZasski*, *35*, 505-511.

[13] Moore, M. N., & Halton, D. W. (1973). Histochemical changes in the digestive gland of Lymnaeatruncatula infected with Fasciola hepatica. *Zeitschrift für Parasitenkunde*, *43*(1), 1-16.

[14] Das, S. K., Nandi, S., Sompomu, R., &Subba Rao, G. (1989). Two New Snail Pests, Cyclophorusfulguratus (Pfeiffer) and Cryptaustenia ovata (Blanford) of Mulberry Plants of Kalimpong. *Indian Journal of Sericulture*, *28*, 267-8.

[15] Mohandas A 1974, The pathological effect of larval trematodes on the digestive glands of four species of gastropods;FoliaParasitol. (Prague)21 219–224

[16] Shaw, M. K., & Erasmus, D. A. (1987). Biomphalaria glabrata: changes in calcium reserves following parasitism by larval Schistosoma mansoni. *Parasitology*, *95*(2), 267-276.

[17] Yoshino, T. P. (1976). The ultrastructure of circulating hemolymph cells of the marine snail Cerithidea californica (Gastropoda: Prosobranchiata). *Journal of morphology*, *150*(2), 485-493.

[18] Cheng, T. T., & Rifkin, E. (1970). Cellular reactions in marine molluscs in response to helminth parasitism. *Special Publications. American Fisheries Society*, (5), 443-496.

[19] Bouix-Busson, D., Rondelaud, D., &Barthe, D. (1985). L'infestation de Lymnaea glabra Müller par Fasciola hepatica L.-I—Étude des lésions de la glande digestive et du rein chez de jeunesmollusques. *Annales de parasitologiehumaine et comparée*, *60*(5), 571-585.

[20] Rondelaud, D., &Barthe, D. (1978). Arguments et propositions pour une nouvelle interprétation de l'évolution de Fasciola hepatica L. dans Lymnaea (Galba) truncatula Müller. *Annales de ParasitologieHumaine et Comparée*, *53*(2), 201-213.