International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 6; Issue 11; November 2017; Page No. 7767-7771
DOI: http://dx.doi.org/10.24327/ijcar.2017.7771.1223

Research Article

DYNAMICS OF PARASITE POPULATION AND ITS HISTOPATHOLOGICAL EFFECTS ON THE HOST

Deolalikar Rajshri Vijay*

Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, M.S

A R T I C L E I N F O

Article History:
Received 15th August, 2017
Received in revised form 25th September, 2017
Accepted 23rd October, 2017
Published online 28th November, 2017

Key words:

Gangesia sp; Wallageo attu, physiochemical, physiological.

A B S T R A C T

Present study was conducted to investigate the occurrence and pathological changes induced by *Gangesia sp.* in the intestine of freshwater fishes, *Wallago attu.* The study was conducted during July 2010 to December 2011. A total of twenty four (24) samples of fish, *wallago attu* were collected from Sukhana Dam. Sixteen (16) species of tapeworms were collected from the intestine of host fish. The incidence of infection, intensity of infection, index of infection, abundance and dominance of parasite has been recorded. The parasites have caused severe changes in the host. The infestation of helminth parasites to the fish brings vital changes in the host body.

These changes not only reflect on the physiological status of the organism but many important physiological functions are interrupted. The energy yielding process of the body is generally effected thus the physicochemical constituents of various regions of the host effected. Worms penetrate through intestinal layers causing damage to mucosa, submucosa, and come to lie near the muscularis mucosa.

INTRODUCTION

Helminth parasites are important agents among etiology of many fish diseases and may harm their hosts in different ways. These parasites may cause irritation, injury or atrophy of tissues and occlusions of other ducts or alimentary canal. Their presence may lead to certain changes in the activity of enzymes, vitamins or hormones of their hosts. Also, they may introduce toxic metabolic by products that may lead to deprive fish from normal feeding (Williams, 1967). For cestode parasites the most favourable and selected site is the alimentary canal, and the reason is to meet their primary need of food from the host. Due to the disfunctioning of the digestive tract, this result in the accumulation of various metabolites. Parasites have caused severe changes in the host. Others who have reported on the cestode infection in fishes are Satpute and Agarwal, (1974); Pronina and Pronin, (1982); Chubb, (1982); Chakravarthy and Veena, (1989); Hasnain, (1992). It is observed that the cestodes cause histopathological changes in fresh water fishes (Mackiewicz *et al*., 1972; Hayunga, 1979; Bunoti, 1980; Bose and Sinha, 1983; Zaman and Keong, 1989; Zaman and Seng, 1990; Lyngdoh and Tandon, 1996).

In India it is estimated that about 10 million tons of fish are required to meet the annual demand of fish proteins as compared to an actual annual production of only 3.5 million tons (Shukla and Upadhyay, 1998). In order to get better nutrition from fishes, it must be free from diseases. Fish diseases may be due to parasitic or nonparasitic causes. Among the parasites that infect freshwater fishes, helminth is one of the diversified groups. The population dynamics shows the prevalence, mean intensity, abundance and dominance of the collected parasites. During this study we also observed protozoans, crustaceans, Monogenea as well as Acanthocephala and Nematodes. Hafeezullah, (1993) and Jadhav *et al.,* (2010) reported, host belongs to family Bagridae, Heteropneustidae, Schilbeidae and Siluridae, Mastacembelidae, Clariidae have been reported as definitive hosts of cestodes.

Parasitic infestation tends to decrease the growth rate resulting in stunting of the fish. The damage caused by helminths to their hosts is generally related to the intensity of infestation and the depth of parasite penetration with the host tissue. Seasonal fluctuation, locality, age, size and sex of the host also determine the parasitic community diversity and burden. Parasitic diseases of fishes are very common all over the world. Globally the parasites (defined broadly as infectious agents of diseases) are responsible for 19% of human mortality (WHO, 2004).

MATERIAL AND METHODS

The aim of the present study was to determine the parasite fauna of fish as well as to observe the histopathological

Corresponding author:* **Deolalikar Rajshri Vijay
Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, M.S

effects caused by cestode parasite belongs to *Gangesia sp.* from Sukhna D a m on Sukhana river (19°48'722"N and 75°31'096"E) in Aurangabad district, Maharashtra state. During the study period, an attempt was made to collect nearly an equal number of fishes of which most were of the small and medium size. The fishes were killed immediately before examination. The examinations were made with a binocular stereoscopic microscope. When possible, parasites were removed from the host and identified while in the living state. Weight and length was measured after collection of fishes. Identification is done by using standard keys (Khalil, 1991; Parpena, 1996).

The infected guts were removed and fixed in Bouins fluid for 7 hours. They were later preserved in 10% of phosphate buffered formulation. They were counted and recorded. All the recovered gastrointestinal helminth parasites were sorted out into their various groups (Cestodes, Trematodes, Nematodes and Acanthocephala). The parasites were preserved and fixed in 70% alcohol.

Histopathoogy technique

Fish tissues were fixed in Bouin's fluid for six to seven hours and later impregnated in molten paraffin wax three times and later embedded in molten paraffin wax and allowed to solidify. The blocked tissues were sectioned at 4-5µ floated into precoated slides and dried. The sections were later stained which colour the nucleus and eosin stains which colour the cytoplasm of the cell. The stained tissues were washed off in tap water and the over stained ones destained in tissues were finally mounted using DPX mountant and dried. They were later examined under the microscope and their photomicrographs were taken.

Biostatistical parameters of the parasites are calculated for population dynamics. The prevalence, incidence, intensity, index of infection, abundance and dominance were calculated from collected cestode parasites along the graphical distribution.

The mean intensity was determined by dividing the total number of collected parasites by the number of infected fish samples, while abundance was calculated by dividing the total number of collected parasites by the number of host fish examined. The dominance of a parasite species was calculated as n/N sum (where n=abundance of a parasite species and N sum = sum of the abundance of all parasite species found).

RESULT AND DISCUSSIONS

After cestode parasite infection, there is a drastic alteration which leads to the destruction of the internal anatomy. Healthy intestine of fishes showed the healthy structure of all layers i.e. serosa, muscularis mucosa, submucosa and mucosa (Fig. 1). In T. S. of the infected intestine, it observed that the scolex of these worms penetrated through intestinal layers causing damage to mucosa, submucosa, and come to lie near the muscularis mucosa. The villi encircle the scolex cestodes and intestinal architecture get damage due to the invasion of the worm's scolex. The infestation of helminth parasites to the fish brings vital changes in the host body.

These changes not only reflect on the physiological status of the organism but many important physiological functions are interrupted. Parasite infection leads the flattening of the surface epithelium, complete damage of lamina propria and oedema of submucous membrane was noticed. The muscular layer in the columnar cells present in it is completely degenerated necrosis and the raising of secondary folds of the muscularis layer is also evidenced. Parasites acquire other favourable necessary requirement and food material for its nourishment and growth from the host tissue by causing damage to the intestinal tissue of host. The parasitic infection in turn disturbs the metabolic pathways. Esch *et al.,* (1977) reported that the worm is not only successful to enter into the intestine forming the ulceration in the intestinal wall causing damage to the host tissue but the parasite may affect host physiology in many ways that induce stress in the host.

Satpute and Agarwal (1974) observed histopathological changes in the stomach of *Clarias batrachus* infected with *Lytocestus indicus.* Kanth and Srivastava (1984) observed same kind of histopathological changes in the intestine of *Heteropneustes fossilis* infected with monozoic caryophyllid tapeworm *Lytocestoides fossilis.* Rees (1967) observed inflammation fibrosis associated with hyperplasia and metaplasia in a cestode infection. Sircar and Sinha (1980) observed degenerative changes include hypertrophy and hyperplasia of the intestinal villi. Ahmad and Muhammad (1979) observed shallow ulcers in host fish due to *Lytocestus indicus.* Similar observations were made by Kanth and Srivastava (1984), Sircar and Sinha (1980), Ahmad and Muhammad (1979), Rees (1967) and Stirewatt (1963) that the damage of the host tissues may be due to secretion of lytic enzymes and penetrative damage caused by the parasite when it establishing its position in the host.

In the present observation, the infected intestine of *Wallago attu,* shows that the scolex of worm deeply penetrated through intestinal layers causing heavy mechanical injury to mucosa, submucosa, come to lie near the muscularis mucosa. The intestinal villi encircle the scolex of worm and intestinal architecture get disturbed by the invasion of the worm scolex (Fig.2).

In present study, at Sukhana Dam we collected fish *Wallago attu* (n=24), along with common carp and other Indian major carp fishes. The population dynamics shows the prevalence, mean intensity, abundance and dominance of the collected parasites of *Gangesia sp*. are shown in Table along with graphical distribution. (Fig.3).

Sixteen (16) parasites of *Gangesia sp*. were collected from *Wallago attu.* During this study we collected the ectoparasite *Argulus* from all fish species. Most *Argulus* was collected from the mouth cavity, gills and the fins. Major water systems of India demonstrate a high degree of host specificity, with Siluriform fish being the most common hosts for both monozoic and segmented cestodes. The occurrence of very few helminth parasites in *Heteropneustes fossilis* and *Wallago attu* could be attributed to resistance to helminth infections. Aquatic birds are important in the ecology of fish parasites because most helminths complete their life cycles in the bird host.

Wallago attu

It was found that, high incidence of infection of parasite were recorded in summer,(Feb,2011-May,2011) followed by winter,(Oct,2010-Jan,2011) whereas infection was low in monsoon season,(July,2010-Sept,2010).

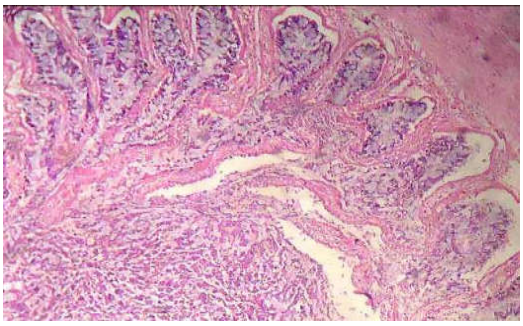


Fig 1 T.S of healthy intestine of *Wallago attu.*

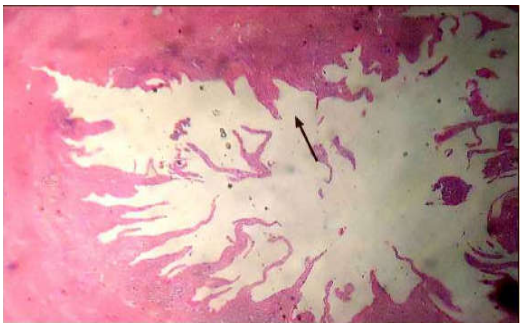
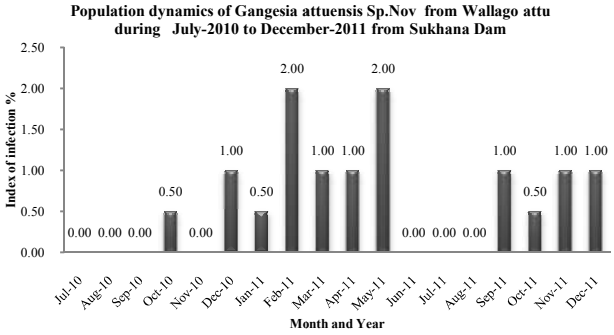
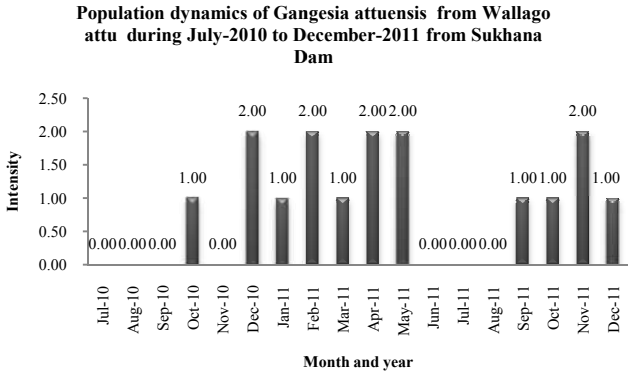


Fig 2 T.S of infected intestine of *Wallago attu* infected with *Gangesia sp.*



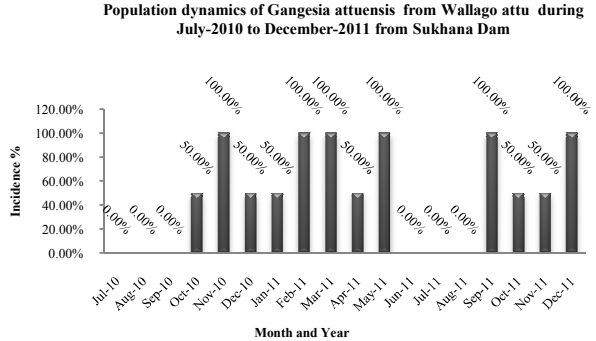


The result of present study are in agreement with Bhure *et al;* (2010) observed high incidence, intensity and density of *Rhabdochona* sp. in summer followed by winter and rainy season. Bhure *et.al; (*2013) studied diversity and prevalence of avian cestodes and obtained similar result. Then Bhure *et al*; (2011) observed high incidence, intensity, density and index of infection of silurotaenia raoii in summer followed by winter whereas infection was low in monsoon. Kasar *et.al*; (2012) observed same result i.e. high prevalence of cestode *Valipora singhii* in summer. Bhure and Nanware, 2014 recorded high incidence of infection of *Cotugnia dignopora*, *Cotugnia diamarae* and *Raillietina (R.) domestica* in summer (75%, 67.85% & 71.42%) followed by winter (60%, 52% & 48%) whereas infection was low in monsoon season (38.09%, 33.33% &38.09%). Jadhav and Bhure, 2006 reported high

Fig 3 Table along with graphical distribution.

Population dynamics of *Gangesia attuensis* from *Wallago attu* during July 2010 to December 2011 at Sukhana Dam

Sr. No.	Month and year	No. of host examined	No. of host infected	Total no. of parasite collected	Incidence %	Intensity	Density	Index of infection %	Abundance	N sum	Dominance
1	Jul-10	1	0	0	0%	0.00	0.00	0.00	0.00	32.08	0.000
2	Aug-10	1	1	0	0%	0.00	0.00	0.00	0.00		0.000
3	Sep-10	1	0	0	0%	0.00	0.00	0.00	0.00		0.000
4	Oct-10	2	1	1	50%	1.00	0.50	0.50	0.50		0.016
5	Nov-10	1	1	0	100%	0.00	0.00	0.00	0.00		0.000
6	Dec-10	2	1	2	50%	2.00	1.00	1.00	1.00		0.031
7	Jan-11	2	1	1	50%	1.00	0.50	0.50	0.50		0.016
8	Feb-11	1	1	2	100%	2.00	2.00	2.00	2.00		0.062
9	Mar-11	1	1	1	100%	1.00	1.00	1.00	1.00		0.031
10	Apr-11	2	1	2	50%	2.00	1.00	1.00	1.00		0.031
11	May-11	1	1	2	100%	2.00	2.00	2.00	2.00		0.062
12	Jun-11	1	0	0	0%	0	0.00	0.00	0.00		0.000
13	Jul-11	1	0	0	0%	0	0.00	0.00	0.00		0.000
14	Aug-11	1	0	0	0%	0	0.00	0.00	0.00		0.000
15	Sep-11	1	1	1	100%	1.00	1.00	1.00	1.00		0.031
16	Oct-11	2	1	1	50%	1.00	0.50	0.50	0.50		0.016
17	Nov-11	2	1	2	50%	2.00	1.00	1.00	1.00		0.031
18	Dec-11	1	1	1	100%	1.00	1.00	1.00	1.00		0.031
	Total	24	13	16	54.17%	1.23	0.67	8.67	0.67		0.021



temperature, low rainfall and sufficient moisture are necessary for development of parasite. Hence high prevalence occurs in summer followed by other seasons. Kennedy C.R. 1970, 1974,1976,1977 explained temperature, humidity and rainfall, feeding habits of host, availability of infective host and parasite maturation are responsible for influencing the parasitic infections, Pennuyuick, 1973, reported fishes and other animals were infected with large number of parasites in late winter to end of summer months, as environmental conditions are favourable in these months. Seasonal fluctuation, locality, age, size and sex of the host also determine the parasitic community diversity and burden. Dogiel *et al*., (1961) stated that seasonal environmental changes of water such as temperature, pH and conductivity affect on the occurrence of parasites from aquatic host. The gravid proglottides may disperse along with the run of water to spread the infection which might probably occur during the monsoon.

CONCLUSION

In conclusion, the obtained results show that helminths are important parasites of fishes in Sukhana dam, and detailed studies on the seasonal variations of these helminth parasites is recommended. Being parasitic in nature, they damage the organ on which they subsist. As a result, the physiological activities of victimized fishes are hindered and their growth is retarded which cause economic loss. The temperature and rainfall play significant roles in the dispersion of the infective agents.

References

1. Ahmad, A.T. and Muhammad's. (1979). Pathological Observations of the Intestinal Lesions Induced by Caryophyllid Cestodes in *Clarias batrachus* (Linnaeus) (Siluriformes: Clariidae) *Fish pathol*. 14 (1): 1-7.
2. Bhure DB, Nanware SS, Kardile SP, Dhondge RM. A survey of the population ecology of Rhabdocona Ralliet, 1916 (Nematoda-Rhabdochonidae) from Labeo rohita (Ham. And Buch.) The Ecosphere (*An International Biannual Journal of Environment and Biological Sciences*).2010; 1(1): 12-24.
3. Bhure DB, Nanware SS, Kasar CR. Studies on Prevalence of Cestodes parasitizing *Gallus gallus domesticus*. *Environment Conservation Journal* 2014; 15(1&2): 171-175.
4. Bhure DB, Nanware SS, Sunnap NV. Status of Diversity of Cestode Parasites of Domestic Fowl (*Gallus Gallus Domesticus*) from Nanded District, Maharashtra State. *Indian Journal of Applied Research* 2013; 3(10): 28-31.
5. Bhure DB, Nanware SS. Population Dynamics of Silurotaenia raoii Bhure *et al*. 2010 from Mystus seenghala. The Ecosphere (An International Biannual *Journal of Environment and Biological Sciences*). 2011; 2(1&2): 9-12.
6. Bose, K.C. and Sinha, A.K. (1983). Histopathology of Clarias attributable to the intestinal cestode *Lytocetus indicus*. *Proc. Natl. Acad. Sci. India. Sec.B. Biol. Sci*. 53: 226-230.
7. Bunoti, W.M.A.N. (1980). The prevalence and pathology of the cestode *Polyonchobothrium clarius* (Woodland, 1925) in the teleost *Clarias mossambicus* (peters) *J. Fish. Dis.* 39(3): 223-230.
8. Chakravarthy, R. and Veena, T. (1989). Caryophylliasis in the cat fish, *Clarias batrachus* L. some histopathological observations. *Proc. Indian Acad. Sci. Anima Sci.* 98: 127-132.
9. Chubb, J.C. (1982). Seasonal occurrence of helminthes in fresh water fishes. Part.IV. Adult Cestoda, Nematoda and Acanthocephala. *Advances in Parasitol*, 20: 1-292.
10. Dogiel VA, Petrushevski GK, Polyanski YI. (1961). *Parasitology of fishes*. Leningrad: University Press; PMid:13723441
11. Esch G.W, HazenT.C, AhoJ.M. (1977). Parasitism and rand Kselection In: GW Esch (ed), *Regulation of parasite populations*. Academic Press New York 9-62.
12. Hafeezullah, M. (1993). Caryophyllidean cestode fauna of India. *Records of the Zoological Survey of India*, Occasional paper no. 157, 101
13. Hasnain, M., (1992). New cestoda Senga chauhani sp. nov. from a fish host *Channa puctatus* from Jamshedpur. *Indian. J. Helminthol*. 44 (2): 121-127.
14. Hayunga, E.G. (1979). Observations on the intestinal pathology caused by 3 caryophyllaeid tape worms of the White sucker *Catostomus commersonic* (Lacepede). *J. Fish. Dis*. 2: 239-248
15. Jadhav BV, Bhure DB. Population dynamics of Helminth parasites in freshwater fishes from Marathwada region (M.S.) *India. Flora and Fauna an International Research Journal* 2006; 12(2): 143-148.
16. Jadhav, B.V., Bhure, D.B., Padwal, N. and Nanaware, S.S. (2010). Survey of tapeworms from Aurangabad region. *Records of the Zoological Survey of India: A Journal of Indian Zoology*, 110 (Part-1): 107-114.
17. Kanth, L.K. and Srivastava, L.P. (1984). Host-parasite relations in monozoic tape worm, Lyto-cestoides fossils infection of fresh water fish, *Heteropneustes fossilis* (Bloch). *Currrent science.* 53: 11-22.
18. Kasar CR, Patki AK, Bhure DB, Nanwarev SS. Seasonal Variation of *Valiphora* Linton, 1927 (Dilepididae-Wardle, McLeod and Radinovsky, 1974) from *Columba livia.* Bionano Frontier 2012; 5(2-1): 212-213.
19. Kennedy CR. A checklist of Britist and Irish freshwater fish parasites with notes on their distribution. *J fish Bio*l 1974; 6(5):613-644.
20. Kennedy CR. The regulation of fish parasite populations. In regulation of parasite population 1977 (a); 61-109.
21. Kennedy CR.Ecological aspects of Parasitology. North Holland publishing company Amsterdam 10X ford, 1976.
22. Khalil, L.F. (1991). Techniques for identification and investigative helminthology: Techniques for processing platyhelminths and acanthocephalans, in *Helminthology manual*, edited by L.F. Khalil. London: International Institute of Parasitology.
23. Lyngdoh, R.D. and Tandon, V. (1996). Some caryophyllidean cestodes. Parasitizing edible cat fishes a morphological, histocytological and histochemical approach to the host parasite relationship. North Eastern Hill Uni, Shillang. *J. Parasitol. A Animal Biol*. 5:67-74.
24. Mackiewicz, J. S. (1972). Caryophyllidea (Cestoidea): a review. *Experimental Parasitology,* 31: 417-512.

25. Parpena, I. (1996). Parasites, infections and diseases of fishes in Africa: An update. FAO/CIFA Technical Paper, 31:130-199.
26. Pennyuick KL. Seasonal variation in the parasite population of three spined Stickle backs, *Gasterosteus aculeatus L.Parasitology* 1973; 63: 373-388.
27. Pronina, S.V. and Pronin, N.M. (1982). Structure of the digestive tract of healthy pike *Esox lucius* (Esoxidae) and of those fishes infected with the cestode, Trisaenophorus (Pseudophyllidea: Triaenophoridae) VOPR IKHTIOL., 22 (4): 641-648.
28. Rees G. (1967). Pathogenesis of adult cestodes *Helminthol*. Abstr.36:1-23.
29. Satpute, L.R. and Agarwal, S.M. (1974). Seasonal infection of *Clarias batrachus* (L.) by *Lytocestus indicus* (Moghe, 1931) and parasitic effects on its hematology and histopathology. *Ind. J .Exp. Biol.* 12: 584-586.
30. Satpute, L.R. and Agarwal, S.M. (1974). Seasonal infection of *Clarias batrachus* (L.) by *Lytocestus indicus* (Moghe, 1931) and parasitic effects on its hematology and histopathology. *Ind. J .Exp. Biol.* 12: 584-586.
31. Shukla, G.S. and Upadhyay, V.B. (1998). *A textbook of economic zoology*. Rastogi Publications, India, 205 p.
32. Sircar, M. and Sinha, D.P. (1980): Histomorphology of *Lytocestus indicus* infection in the fish Clarias batrachus. *Indian Soc. J. Anim. Res.*, 14 (1): 53-56.
33. Stirewatt, M.A. (1963). Chemical biology of secretions of larval helminthes. *Ann. NY Acad. Sci*., 113: 36-53.
34. WHO. (2004). Report of Joint WHO/FAO workshop on Food-borne trematodes infections in Asia, Ha Noi, Vietnam, 26-28 November, 2002. World Health Organization. WRPO, 1-58.
35. Williams, H. H. (1967). Helminth diseases of fish. *Helminthol. Abst*. 36: 261-295.
36. Zaman V, Loh Ah Keong. (1989): Handbook of Medical Parasitology. Singapore: KC Ang Publishing. 113-117.
37. Zaman, Z. and Seng, L.T. (1990). Distribution patterns of a caryophyllaeid cestode in the gut of fish of the Clarias genus from Pendang, Malaysia. Dhaka Uni. Stud. Part E. *Biol.Sci*., 5 (2):115-122.

How to cite this article:

Deolalikar Rajshri Vijay (2017) ' Dynamics of Parasite Population And Its Histopathological Effects on The Host', *International Journal of Current Advanced Research,* 06(11), pp. 7767-7771.
DOI: http://dx.doi.org/10.24327/ijcar.2017.7771.1223

****