*INT. J. BIOL. BIOTECH.*, 6 (1-2): 71-74, 2009.

# STUDIES ON THE INFESTATION IN RELATION TO SEX OF THE HOST FISH *LUTJANUS ARGENTIMACULATUS* (FORSK., 1775)

**[1]Rizwana, A.G., N. Khatoon[1] and F.M. Bilqees[2]**

*[1]Department of Zoology, University of Karachi, Karachi-75270, Pakistan.*
*[2]Department of Zoology, Jinnah University for Women, Nazimabad, Karachi, Pakistan*

## ABSTRACT

A marine fish, *Lutjanus argentimaculatus* of the Karachi coast, was studied for effect of its sex on the abundance of its parasites. The infestation of parasites did not show any significant difference in male and female fishes. But the result showed significant difference between the level of infection of the dominant parasites in male and female *Lutjanus argentimaculatus.*

**Key Words:** Helminth parasites, *Lutjanus argentimaculatus* Sex of fish, Parasitic infection.

## INTROUCTION

Economically, the fishes constitute a very important group of animals. Besides being used as food, they provides byproducts of various kinds. Most parasites carried by fishes are acanthocephala, nematodes, cestodes and trematodes. Due to the presence of parasites, large amount of eggs and fry are destroyed. Certain parasitic species inhibit fish gonads or reproductive organs. They parasitize their hosts partially or wholly. The spawning migration and spawning of fishes may cease by the parasitic infections on fishes.

Host sex has shown to be a significant factor. Drobney *et. al.,* (1983) discussed the similarity between the species composition of the parasites in male and female fishes whereas Drobney and Fredrickson (1979) showed that female's diet contain a much higher proportion of invertebrates and this increase their chance of ingesting more infective intermediate hosts than the males. Hare and Burt (1975) worked on the abundance and population dynamics of parasites. Another report by Tavares Luque (2004) showed that host sex did not influence parasite prevalence.

The present study is undertaken to investigate the variation of infection in male and female individuals of a local fish, *Lutjanus argentimaculatus*.

## MATERIALS AND METHODS

From January 2001 to December 2005, 3573 fishes were collected from different fish markets of Karachi. They were brought to the laboratory of parasitology, Department of Zoology, University of Karachi. Of these fishes, 1580 were male and 1993 were female. They were examined for the helminth parasites. Nematodes, trematodes and acanthocephala were recovered from different organs of male and female fishes. They were studied and identified under microscope. Nematodes were preserved in a 1:1 mixture of 70% alcohol and glycerine. Trematodes and acanthocephala were fixed in F.A.A. solution for 24 hours. Then, they were washed with 70% alcohol and stained with Mayer's carmalum, dehydrated in graded series of alcohol, cleared in clove oil and xylene and mounted permanently in Canada balsam.

## RESULTS AND DISCUSSION

In the present investigation a total of 3573 fishes were examined; of which 1580 (44.03%) were male and 1993 (55.99%) were female whereas 1092 (69.11%) were infected male and 1574 (79.13%) were infected female (Table 1).

In the present investigation, the intensity and percentage of infestation of only the most dominant helminth parasites in male and female fishes have been analyzed to determine the difference of infestation rates between the sexes.

Among the trematodes *Lecithocladium psenopsis, Lecithocladium* sp., *Erilepturus lemeriensis*; trypanoshyncha *Callitetrarhynchus megacanthus, Callitetrarhynchus speciosus*; nematodes *Anisakis* sp., larvae, *Contracaecum* sp., lavare, *Camallanus guttati*, *Spirocamallamus pereirei* and acanthocephala *Serrasentis giganticus*, are selected to analyze the difference of infestation rates.

One of the most interesting result of the present investigation is the dearth in significant difference between the levels of infestation of dominant parasites in male and female *Lutjanus argentimaculatus*. The small differences observed were more likely to be attributable to the higher physiological resistance of the females then to the differences in ecological or behavioral resistance of the two sexes (Table 2).

The similarly between the species composition of the parasites in male and female indicated that both sexes would stand an equal chance of being infected by helminths which require the intermediate hosts (Drobney *et al*., 1983). Despite the preceding similarity observed in the present studies significant sex-related differences were found in the intensity and in prevalence of infection in seasons (Table 2).

In the present investigation, the sex of host got little bearing on the prevalence and intensity of *Lecithocladium psenopsis*, though, the abundance of the trematode was slightly higher in females than in males (Table 2).

Table 1: Sex-wise frequency distribution of *Lutjanus argentimaculatus* (Forsk., 1775) during 2001-2005.

| Year | No. of fish Examined | No. of Male fish | No. of infected Male fish | Frequency (%) | No. of Female fish | No. of infected Female fish | Frequency (%) |
|---|---|---|---|---|---|---|---|
| **2001** | 933 | 409 | 280 | 68.45 | 524 | 470 | 89.69 |
| **2002** | 894 | 400 | 319 | 79.75 | 494 | 396 | 80.16 |
| **2003** | 664 | 288 | 205 | 71.18 | 376 | 287 | 76.32 |
| **2004** | 512 | 230 | 183 | 79.56 | 282 | 151 | 53.54 |
| **2005** | 570 | 253 | 105 | 41.66 | 317 | 270 | 85.17 |
| **Total** | 3573 | 1580 | 1092 | 69.11 | 1993 | 1574 | 7913 |

Table 2. Prevalence of parasites recovered from *Lutjanus argentimaculatus* (Forsk., 1775) during 2001-2005.

| Parasitic species | No. of hosts | Prevalence (%) | No. of Male hosts | Prevalence (%) | No. of Female hosts | Prevalence (%) |
|---|---|---|---|---|---|---|
| **Digeneans:** | | | | | | |
| *Erilepturus lemeriensis* | 176 | 4.93% | 97 | 55.11 | 79 | 44.88 |
| *Lecithocladium psenopsis* | 265 | 7.42% | 127 | 47.92 | 138 | 52.06 |
| *Lecithocladium* sp. | 152 | 4.26% | 74 | 48.68 | 78 | 51.31 |
| **Trypanorhyncha larvae:** | | | | | | |
| *Callitetrarhynchus megacanthus* | 89 | 2.50% | 44 | 49.43 | 45 | 50.56 |
| *Callitetrarhynchus speciosus* | 71 | 1.99% | 34 | 47.88 | 37 | 52.11 |
| **Acanthocephala:** | | | | | | |
| *Serasentis giganticus* | 79 | 2.21% | 37 | 46.83 | 42 | 53.16 |
| **Nematodes:** | | | | | | |
| *Anisakis* sp. (larvae) | 1265 | 35.40% | 553 | 43.71 | 712 | 56.28 |
| *Contracaecum* sp. (larvae) | 1050 | 29.39% | 474 | 45.14 | 576 | 54.85 |
| *Camallanus guttati* | 115 | 3.22% | 52 | 45.21 | 63 | 54.78 |
| *Spirocamallanus pereirei* | 63 | 1.76% | 15 | 23.80 | 48 | 76.19 |

As compare to males, females spend more than twice as much time in feeding and their diet contain a much higher proportion of invertebrates. This increase their chance of ingesting more infective intermediate hosts than the males (Drobney and Fredrickson, 1979) whereas several evidences suggest that the infestation of a number of parasites in females was the results of differences in their food habits and feeding behaviour. The other reason for higher parasitic infestation might be the requirement of high nutrition during egg synthesis (Drobney, 1980).

Host sex was shown to be a significant factor in determining the abundance of parasites infecting fishes (Table 2). In the present study, collection of male and female fishes were treated separately in all subsequent analyses.

Considering the locations of infection, the trematode *Lecithocladium psenopsis, Lecithocladium* sp., *Erilepturus lemeriensis* trypanorhyncha, *Callitetrarhynchus megacanthus,Callitetrarhynchus speciosus* nematode *Anisakis* sp., larvae, *Contracaecum* sp., larvae, *Camallanus guttati*, *Spirocamallanus pereirei* and Acanthocephala *Serrasentis giganticus* has been selected for analyses as parasites of stomach, intestines and visceral mesenteries.

In present study, the difference in incidence of *Contracaecum* sp., larvae in male and female were not significant (Table 2). The intensity of infection of this larvae showed no interactions between host sex and reproductive conditions. Arthur *et al*., (1982) compared the prevalence and burden of parasites occurring in the musculature and body cavity of *Walleye Pollock* (*Pleistophora* sp., *Nybelinia surmenicola, Anisakis simplex* larvae, *Contraoaecum* sp., larvae and *Phocanema decipiens*) their preliminary analyses revealed that, no significant difference was observed between male and female Pollock for any of the five species of parasites recovered. Hare and Burt (1975) worked on abundance and population dynamics of parasites infecting Atlantic Salmon. They reported that, the abundance of the parasites showed no relation with host sexes. Tavares and Luque (2004) worked on the seasonal variation of parasites and discussed that host sex did not influence parasite prevalence or mean abundance of any species.

Scott (1981) reported that, the prevalence of alimentary tract parasites of haddock (*Melanogrammus aeglefinus* L.) varied little between fishes. He also suggested that, in the helminths, differences greater than 10%, are not considered biologically significant. Chinniah and Threlfall (1978) and Evans (1978) felt that the sex of the host did not seen to influence the parasite fauna, and they observed no differences in the parasite burden of male and female fishes.

In the present study, most significant difference in prevalence and intensity of *Spirocamallanus pereirei* have been noted which could be due to higher physiological resistance of the male fishes (Table 2). Oestrogen may strengthen the resistance of the hosts but during breeding season, this trend tends to be reversed when oestrogen levels are lower (Pennycuick, 1971a, b).

In the present investigation, both the prevalence and intensity of *Erilepturus lemeriensis* was found higher in male fishes than in female (Table 2). As all the works so far done on *Erilepturus* species on taxonomical positon of the genus and species and infestation in various organs of the fishes but due to non-availability of past records on differences of infestations between male and female fishes, the present species study could not be compared analytically.

Hine and Kennedy (1974) observed that in dace *Pomphorhynchus laevis* showed the marked increase in infection in maturing female hosts. Sanaullah and Ahmed (1978) reported significant differences in infection of most of the nematodes in *Clarias batrachus* and *Heteropneustes fossilis*. They suggested that the sex differences were found to be relevant to the incidence and level of infestation. Similar observations were also made by Kennedy and Li (1974) for eustrongylid nematodes in U.K., and Rashid *et al*., (1984) for trematodes *Orientocreadium batrachoides* in *Clarias batrachus*. The differences in infestation between the sexes could be either due to: (a) either merely a reflection of differential feeding, or (b) due to the different degrees of resistance of infection (Wickins and Mac Farlance, 1973).

A few exceptions to the tendency for male vertebrate animals to be more heavily infested than the females have been reported by Brand (1952), Dudzinski and Mykytowyez (1963), Leigh (1960), Thomas (1964), Pennycuick (1971a, b) and Mcvicar (1977). According to them the reasons include variation in the physiological resistance and the ecology or behaviour of the two sexes.

## REFERENCES

Arthur, J.R., L. Margolis, D.J. Whitaker and T.E. McDonald (1982). A quantitative study of economically important parasites of Walleye Pollock (*Theragra chalcogramma*) from British Columbian waters and effects of postmortem handling on their abundance in the musculature. *Can. J. Fish. Aquat. Sci*., 39: 710-726.

Brand, T. von. (1952). Chemical Physiology of Endoparasitic animals. New York: Academic Press, inc.

Chinniah, V.C. and W. Threlfall (1978). Metazoan parasites of fish from the Smallwood Reservior, Labrador, *Canada. J. Fish Biol*., 13: 203-213.

Drobney, R.D. (1980). Reproductive bioenergetics of wood ducks. *Auk*., 97: 480-490.

Drobney, R.D. and L.H. Fredrickson (1979). Food selection by wood ducks in relation to breeding status. *J. Wildl. Manage*., 43: 109-190.

Drobney, R.D., C.T. Train and L.H. Fredrickson (1983). Dynamics of the platyhelminth fauna of wood ducks in relation to food habits and reproductive sate. *J. Parasitol*., 69 (2): 375-380.

Dudzinski, M.L. and R. Mykytowycz (1963). Relatioship between sex and age of rabbits, *Orytolagus cuniculus* (L.) and infection with nematodes *Trichostrongylus retortaeformis* and *Graphidium strigosum*. *J. Parasit*., 7: 355-356.

Evans, N.A. (1978). The occurrence and life-history of *Asymphylodora kubanicum* (Platyhelminthes: Digenea: Monorchidae) in the Worcester-Birmingham canal, with special reference to the feeding habits of the definitive host, *Rutilus ritilus*. *J. Zool. Lond*., 184: 143-153.

Hare and Burt, (1975). Abundance and population dynamics of parasites infecting Atlantic salmon (*Salmon salar*) in Trout brook, New Brunswick, *Canada. J. Fish Res. Board Can*., 32: 2069-2074.

Hine, P.M. and C.R. Kennedy (1974). Observations on the distribution, specificity and pathogenicity of acanthocephalan *Pomphorhynchus laevis* (Muller). *J. Fish Biol. 6*: 521-535.

Kennedy, C.R. and S.F. Li (1974). The distribution and pathogenecity of larvae of Eustrongylid (Nematoda) in brown trout *Salmo trutta* in Fernworthy Reservoir, Devon. *J. Fish Biol*., 8: 299-302.

Leigh, W.H. (1960). The Florida sppoted Gar, as the intermediate host for *Odhneriotrema incommodum* (Leidy, 1856) from *Alligator mississippiensis. J. Parasit*., 46: (5, Sect. 2): 16.

McVicar, A.H. (1977). Intestinal helminth parasites of the ray *Raja naevuss* in British waters. *J. Parasitol*., 65: 11-21.

Pennycuick, L. (1971a). Differences in the parasite infections in three-spined sticklebacks (*Gasterosteus aculeatus* L.) of different sex, age and size. *Parasitology*, 63: 407-418.

Pennycuick, L. (1971b). Seasonal variations in the parasite infections in a population of three-spined sticklebacks (*Gasterosteus aculeatus* L.). *Parasitology*, 63: 373-388.

Rashid, M.M., A.K.M.A. Haque and K.J. Chandra (1984). Effect of season, sex and size of *Clarias batrachus* on the population of *Orientocreadium batrachoides* in Mymensingh, Bangladesh. *Bangladesh J. Fish*., 7 (1&2): 21-25.

Sanaullah, M. and A.T.A. Ahmed (1978). Observations on some aspects of association in the parasitic infections in the catfishes *Heteropneustes fossilis* (Bloch) and *Clarias batrachus* (L.) of Bangladesh. *Bangladesh J. Fish*., 1 (2): 67-73.

Scott, J.S. (1981). Alimentary tract parasites of haddock (*Melanogrammus aeglefinus* L.) on the Scotian Shelf. *Can. J. Zool*., 59: 2244-2252.

Tavares, L.E.R. and J.L. Luque (2004). Community ecology of the metazoan parasites of white sea catfish, *Netuma barba* (Osteichthyes: Ariidae), from the coastal zone of the State of Rio de Janeiro, Brazil. *Braz. J. Biol*., 64 (1):

Thomas, J.D. (1964). A comparison between the helminth burdens of male and female brown trout, *Salmo trutta* L., from a natural population in the River Teify, West Wales. *Parasitology*, 4: 263-272.

Wickins, J.F. I.S. MacFarlane (1973). Some differences in the parasitic fauna of three samples of plaice (*Pleuronectes platessa* L.) from the southern North Sea. *J. Fish. Biol*., 5: 9-19.

(*Accepted for publication November 2008*)