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ON THE OCCURRENCE OF PARASITIC TREMATODES *OLIVACREADIUM HETERORCHIS* (BILQEES, 1976) AND *PLEORCHIS HETERORCHIS* (SHAUKAT, 2008) IN HELMINTHS-INFECTED FISH *JOHNIUSS DUSSUMIERI* (VALENCIENNES, 1833) OF KARACHI COAST

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ABSTRACT

A total of 538 samples of edible fish *Johniuss dussumieri* (Valenciennes, 1833), locally called 'Mushka, from Karachi coast were examined for helminth infection from January 2009 to December 2009. Out of 538 fish, 266 were found to be infected with helminth parasites (cestodes, nematodes, trematodes and acanthocephalans), with prevalence rate of 49%. As regard to the trematodes infection, out of 266 fish, 119 individuals of *Olivacreadium heterorchis* (Bilqees, 1976) and 28 individuals of *Pleorchis heterorchis* (Shaukat, 2008) were recovered. *O. heterorchis* occurred maximum in the months of July and November, 2009 and that of *P. heterorchis* in the month of September, 2009. A negative association was observed between the two trematodes using a Chi-square test of association.

Key-words: Trematodes, Infection, Intensity, Edible Fishes, Karachi Coast

INTRODUCTION

The increasing demand for food may be met with the Seafood resource. Fish are the most common and a very large group of the vertebrates that provide nutrition not only to the human beings but to several other creatures of the Sea. These are numerous and widely distributed throughout the world (Ravindranathan, 2003). Fish contain unsaturated fatty acids that may reduce inflammation throughout the body. Inflammation in the body can damage the blood vessels and lead to heart disease but most of the fresh water and marine fish species are infected with parasites. Helminths are typically the parasites of vertebrates. When they infect fish they have detrimental effects upon fish in many ways (Srivastava, 1975).

Fishes are generally host to four major groups of helminths, the cestodes, nematodes, trematodes and acanthocephalans. The trematodes are one of the common parasites of fishes of Karachi coast. Thousands of trematodes species have been described from various parts of the world. Examination through dissecting microscope of trematode infections depend upon size and number of worms present in the host and organs or tissues parasitized. The pathogenic lesions produced may be local or systemic, usually both. The former consists of ulceration, sloughing of tissue and abscess formation. In fish *Johniuss dusssumieri* (Valenciennes, 1833) mostly adult trematodes *Olivacreadium heterorchis* (Bilqees, 1976) are found in the intestine and stomach *Pleorchis heterorchis* (Shaukat, 2008), respectively. Some are found in liver, bile ducts and other organs. Therefore, significance of fish trematodes cannot be ignored especially because fish is a valuable food commodity. Mortality of fishes due to infections especially in young fishes causes immense economic loss. The present, study, however deals with trematodes of fish, *Johniuss dussumieri* (locally called 'Mushka') of Karachi coast.

MATERIALS AND METHODS

A total of 538 samples of Fish, *Johniuss dussumieri* (Valenciennes, 1833) were monthly collected from Karachi coast for the year 2009. These samples were dissected and examined for various parasites - cestodes, nematodes, acanthocephalans and trematodes. The contents of the gastro-intestinal tract (GIT) were removed and placed in petri dishes containing normal saline. GIT was opened from anterior to posterior in order to observe stomach and intestine-dwelling trematodes. The worms obtained were kept in normal saline and later fixed in 70% alcohol. They were identified using key of Yamaguti (1971). The frequency of infected fish was calculated as:

Frequency (%) = Number of a trematode infected fish / Number of fish studied * 100

The interrelationship between the two trematode species (*O. heterorchis* and *P. heterorchis*) was adjudged by calculating X^2 through 2 x 2 contingency table (Krebs, 1978) and tested for significance following Simpson *et al.*, (1960). The coefficient of strength of association between two trematode species in the contingency table was determined by Association index (V):

$V = ad – bc / \sqrt{(a + b) (c + d) (a + c) (b + d)}$ where a, b, c and d were the usual entries in 2 x 2 contingency table.

RESULTS AND DISCUSSION

A total 538 fishes *J. dussumieri* were examined among which 266 (49.44%) fishes were infected with helminth parasites and 272 (50.56%) were uninfected. The occurrence of *O. heterorchis and P. heterorchis* in helminths infected fishes is presented in Table 1.

Table. 1. Infection of *Johniuss dussumieri* with trematodes.

Months (2009)	Helminths-infected fish	Trematodes infected fish		Frequency of infected fish (%)	
		O. heterorchis infected fish	*P. heterorchis* infected fish	*O. heterorchis* infected fish (%)	*P. heterorchis* infected fish (%)
January	30	10	6	33.33	20.0
February	54	20	0	37.04	0
March	18	7	3	38.89	16.67
April	18	6	0	33.33	0
May	16	7	0	43.75	0
June	19	8	7	42.11	36.84
July	13	9	0	69.23	0
August	27	11	6	40.74	22.22
September	16	10	6	62.50	37.50
October	15	6	0	40.00	0
November	28	21	0	75.00	0
December	12	4	0	33.33	0
Total	266	119	28	-	-
Average % frequency of fish infected with trematode (s) = CV (%) =				45.77 ± 4.22 31.94	11.10 ± 4.32 134.82

It is apparent that infection of fish *J. dussumieri* with *O. heterorchis* was maximum in November and appreciably higher in July and September, 2009. *P. heterorchis* infection was only observed in January, March, June, August and September, 2009. Maximal occurrence of *P. heterorchis* was observed in fish samples of June and September, 2009. One of the reasons for these results is climatic change of the Karachi coast as the hot weather in summer and autumn makes parasites difficult to survive, but in spring the weather is very suitable for parasites to flourish at temperatures 31 ± 2ºC. Tedila and Fernando (1970) discussed that fish become infected in the autumn and peak incidence is recorded in late winter, began to decrease in March and was absent during August-September. Rizwana (2007) observed that temperature is an important factor for the infestation rate of parasites in fishes. There appeared high infestation rate in the hot season. Kondo *et al.* (2016) while studying effect of seasonal changes in trematode population of *Aurelia aurita* clearly showed seasonality, being consistently high in June of each year. Similar results have been reported earlier (Kelle, 1977; Fatima and Bilqees, 1989; Grass-Nawrzyniak *et al.,* 1979; Bussmann and Ehrich, 1979). Liu *et al.* (2010) reported that ecological environment for parasites is complex and diverse the seasonal variations can have drastic effect.

Since *O. heterorchis* and *P. heterorchis* occurred together in some fish in intestine and stomach, respectively, the relationship between these trematodes was ascertained by calculating chi square using 2 x 2 contingency table of occurrence of the two trematodes (Table 2). The probability of obtaining *Pleorchis* from this Table is 28 / 266 =

0.1053 and the probability of obtaining *Olivacreadium* is 119 / 266 = 0.4474. The joint probability of occurrence was thus 0.4474 x 0.1053 = 0.04711, if the two trematode species are not associated (or they are independent). Thus in 266 fish we should expect 12.53 joint occurrences. From the Table 2, we, however, observed only 4 occurrences. It appears that there might be some negative association between the two species. This hypothesis can be tested with calculation of chi square (X^2 = n (ad-bc) ^{2} / (a + b) (c + d) (a + c) (b + d) which appeared to be (-) 11.74 (significant at df =1, p < 0.0001 against a tabulated value of 10.83; see (Simpson *et al.,* 1960) indicating that there is negative association between *Olivacreadium* and *Pleorchis*. The coefficient of association (V) between the two species in the contingency table turned out to be – 0.2101. For in hand trematode species, V = – 0.2101 indicates a negative association between the two species but not strong enough. The reason for such a relationship between *O. heterorchis* and *P. heterorchis* is not known and needs further investigation.

Table 2. 2 x 2 contingency table of presence and absence of the two trematodes infecting *J. dussumieri*.

Species	*Olivacreadium heterorchis*			Total
	Present		Absent	
Pleorchis heterorchis	Present	a = 4	b = 24	28
	Absent	c = 115	d = 123	238
Total		119	147	266

Acronyms: a, Joint occurrence of two trematode species in fish; b, The Number of fish where *Pleorchis* occurred alone; c, The number of fish where *Olivacreadium* occurred alone and d, The number of fish with no trematode parasites.

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