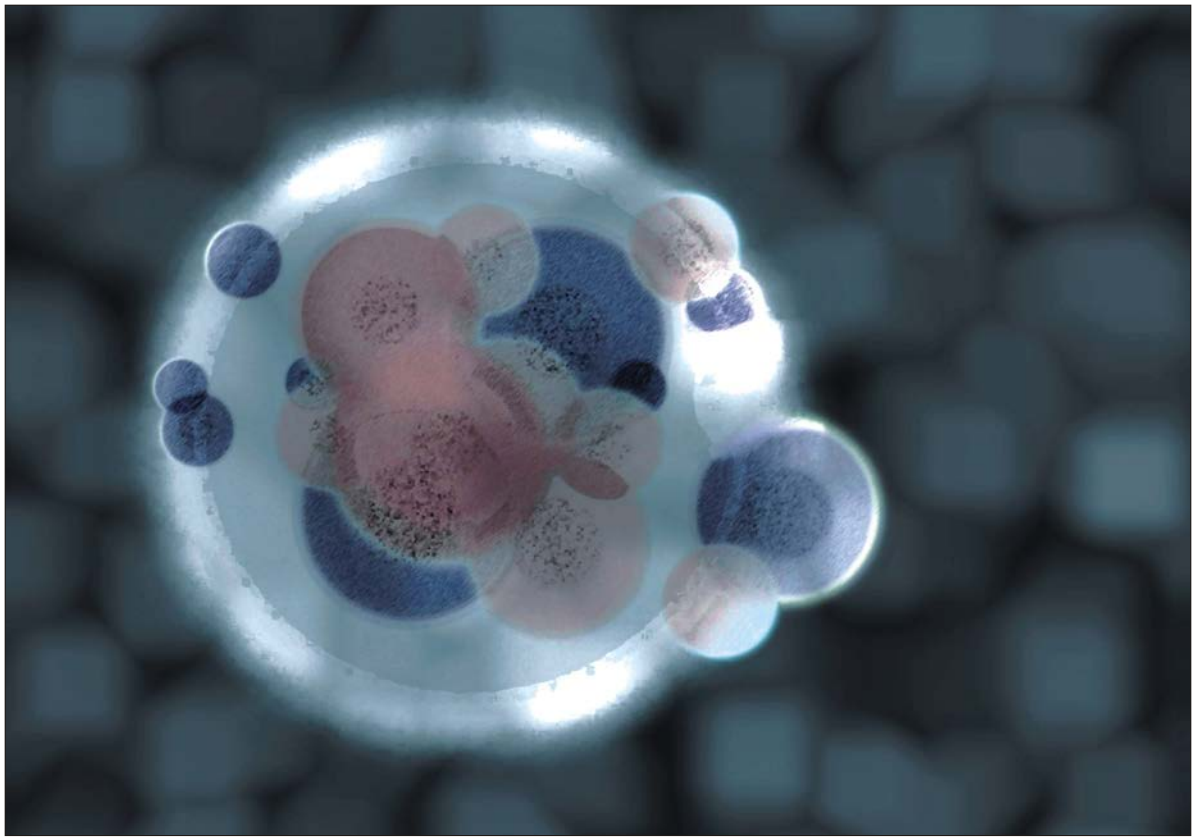




Journal of Biological Sciences

ISSN 1727-3048

science
alert

ANSI*net*
an open access publisher
<http://ansinet.com>

Persistent of Nematode Parasite in Presence of Heavy Metals Found in Edible Herbivorous Fishes of Arabian Sea

¹Rafia Azmat, ²Yasmeen Akhter, ³Rukhsana Talat and ⁴Fahim Uddin
^{1,4}Department of Chemistry, ²Department of Botany and ³Department of Zoology
¹⁻³Jinnah University for Women 5-C Nazimabad Karachi, Pakistan
⁴University of Karachi, Pakistan

Abstract: A study has been planned to investigate the effect of oil pollution with respect to heavy metals in edible herbivorous fishes. Toxic metal like Pb, Hg, As, Cd and Cr were analyzed by Atomic absorption spectrophotometry and subsequently related with nematode parasite. The food contents found in guts of fishes belong to coastal area consists of Phyto Plankton, mud, sand, dinoflagellates and molluscs. Results indicated that due to high percentages of heavy metals and nematode parasite, fishes get infected and experienced more rapid death. These fishes commonly supplied to Karachi city and may be toxic to human health. It was observed that nematode parasites were persistents in presence of toxic metals and they were attached to flesh of fish. Presence of nematode parasite and toxic metals in fishes may be related with the pollution caused by the spreading of oil from Tasman Sprit at Clifton beach Karachi.

Key words: Herbivorous fish, toxic metals, nematode parasite

INTRODUCTION

Heavy metal poisoning is much more common than most people realize. The effect of these toxic metals can range from subtle symptoms to serious diseases. The worst part about heavy metal is that once they build up in body they can cause irreversible damage (Khan *et al.*, 1995). Tragically, our oceans are largely contaminated with industrial pollutants like Hg, Pb, As, Cd, Zn and Cu. Ocean and farm-raised fish pick up these toxic chemical residues, which bio concentrate in their flesh (Tam and Mok, 1991; Florence *et al.*, 1992). Snehalata *et al.* (2001) and Hassani *et al.* (2004) reported the organic mercury species with greatest toxicity are methyl mercury compounds, which have a high affinity for the brain and nervous system. Parasites are a naturally occurring organism. Olukova *et al.* (1997), Muir *et al.* (1992) and Brotheridge *et al.* (1998) reported that brown trout likely to be infected with parasitic nematode *Eustrogyliidae* sp. due to presence of Ni and Cu in fish. Turcekova *et al.* (2002) analyzed As, Cd, Cu, Pb and Zn in perch fish organ and tap worm *Proteocephalus percae* and *Acanthocephalus lucii* which were higher in liver of the fish. The fish and other marine animals eat the larvae. These larvae then develop into the parasites, which were observed in fishes (Datta *et al.*, 1980; Hassani *et al.*, 2004).

The pollution of the Arabian Sea from oil spreading by Tasman sprit disaster at Clifton beach Karachi reaches our newspaper and TV screen when there has been a major accident in 2003. Clean up operation are rarely totally successful. Contaminate persistent for thousands of years. Emulsification, the mixing of oil and seawater make a complete cleans up impossible. Consequently contaminate may spoil the marine life.

This study will examines the effect of oil pollution in fishes, due to heavy toxic metal found in flesh and nematode parasite and also discuss the human health risk arising in marine environment.

MATERIALS AND METHODS

Edible herbivorous fishes *Liza vaigiensis* which is a good edible fish found inshore and off shore water were collected from fish harbor Karachi twice in a month of February to September 2005 in early morning. Twenty specimen of *Liza vaigiensis* (Boi) were examined for their feeding habit and heavy toxic metal analysis with nematode parasite. Physical features of the fishes were recorded; eyes with out adipose lid, scales were larger, color brownish, pectoral fin deep black and having length more than feet. Twenty specimens of herbivorous fishes have been collected from fish harbor Karachi and various



Fig. 1: Blue green algae found in gut of herbivorous fish



Fig. 2: Nematode parasite found in herbivorous fish

market of Karachi, in order to investigate the board area of research. Boi species, which is Herbivorous fish, were examined for their feeding habit by dissecting the guts of fish and observed under the electric microscope (Hyslop, 1980). The food contents found in guts of herbivorous fish were preserved into 10% alcohol and then examined with clutria and stereomicroscope. The photographs were made by photo camera microscope (Fig. 1 and 2).

Heavy toxic metal analysis in the flesh of fish were performed by atomic absorption spectrophotometry by ash method to establish the relation of heavy toxic metal with nematode parasite found in the flesh and guts of herbivorous fish.

RESULTS AND DISCUSSION

There are two main reasons which are consider as the main, most wide spread and most dangerous factors of anthropogenic on the hydrosphere. First, pollution accompanies most kinds of human activities including offshore oil and gas production and marine oil transportation. Second in water environment, pollutant quickly spread over large distances from the sources of

pollution. Oil pollution causes an increase in number of toxic metals and organic compound and also forms oil layer, which prevents the solubility of oxygen for marine life. The danger of the situation is complicated by the fact that when it happens, it will be too late to do anything.

The contaminate mix with water and other aquatic algae and sand and accumulate with fishes. The dissection of gut of herbivorous fish shows the presence of crustaceans, sand, sand grains, algae, molluscs, Planktons and other miscellaneous food including nematode parasites, which were found in form of clusters in stomach and flesh. Nematodes found were unsegmented round worm. These were both in gut and flesh of fishes. The algae eaten by marine herbivorous fishes are phylogenetically diverse (Muir *et al.*, 1992). Unlike terrestrial plant algae are supported by water and have lower proportion of structural elements to cell contents. It is also different in their chemical composition as compare to terrestrial plants. It was also observed that food and feeding habits vary with reference to season.

The heavy metal analysis of flesh of fish shows that it contain toxic metals like, As, Cd, Hg and Pb which may be attributed with both terrestrial and aquatic food chains which are capable of accumulating certain environmental contaminates up to toxic concentration (Sinha *et al.*, 2002).

Chemical contaminates can come from industrial, municipal, agricultural sources or may be due to shipping in the sea. Table 1 shows that high percentage of Pb may be associated with the spreaded oil of Tasman spirit at Karachi (Clifton coastal area). The totally black mud found in the gut of this commonly edible herbivorous fish, which on analysis shows the presence of these toxic metals which may be due to oil pollution. Therefore these contaminates may be of great concern in places suffering from pollution caused by human activity. The total Hg content examined were found to be exceeding the US Environmental protection Agency's ($0.1 \mu\text{g}^{-1} \text{g}$) (EPA)

Table 1: Potential of Toxic metal ions content (ppm) in *Liza vaigiensis* herbivorous fishes from Arabian Sea

Pb	Cd	As	Hg	Cr
0.79±0.02	0.62±0.02	0.09±0.01	0.62±0.02	0.07±0.02
0.58±0.03	0.48±0.01	0.18±0.12	0.25±0.02	0.08±0.02
0.73±0.02	0.59±0.01	0.12±0.02	0.3±0.01	0.09±0.04
0.64±0.01	0.32±0.01	0.13±0.01	0.18±0.01	-
0.33±0.01	0.24±0.01	0.14±0.01	0.3±0.01	-
0.48±0.05	0.16±0.01	0.15±0.02	0.01±0.01	-
0.51±0.02	0.39±0.01	0.17±0.02	0.09±0.02	0.14±0.01
0.64±0.03	0.22±0.01	0.18±0.02	0.13±0.01	0.1±0.01
0.71±0.02	0.21±0.01	0.19±0.01	0.14±0.05	0.11±0.04
0.67±0.03	0.17±0.01	0.23±0.01	0.15±0.01	0.01±0.01
0.38±0.01	0.48±0.02	0.02±0.01	-	-
0.19±0.01	0.19±0.02	-	0.03±0.01	0.05±0.02
0.22±0.01	0.22±0.01	0.08±0.01	0.04±0.01	0.04±0.02
-	0.24±0.05	0.1±0.01	0.05±0.02	0.03±0.01

health screaming value of 0.6 mg kg^{-1} . (Table 1). The residue tolerance level of Pb is (0.5 mg kg^{-1}) and that of Cd (0.05 mg kg^{-1}) and arsenic is ($0.04\text{-}0.15 \text{ } \mu\text{g g}^{-1}$). According to Federal Public Health office have not been extended in any case. But presence of high concentration of these metals is alarming to health risk. Due the presence of parasite and heavy toxic metals, fishes get infected. *Ligula intestinalis* and *philometra ova-ta* were collected from cyprinid fish. The flesh muscle contain Pb, Cd, Hg and Cr (Tenora *et al.*, 2000; Olukova *et al.*, 1999). An increase in concentration of Pb may damage the gill tissue respiration rates and decrease of gill oxygen uptake (Vir and Sharma, 1999), which may be attributed with the productivity of fish. Many fishermen believe that the toxic chemicals in the ocean are killing much of fish population. Lead can cause many health problem. Especially it effects to kidney, brain and reproductive system. It can also lower the fisheries product of marine lives.

The presence of Hg (Snehalata *et al.*, 2001) in trace quantities in crude oil and water, enter aquatic environment and then it can enter the body of aquatic animal such as fish. The measurements of mercury concentration among fish and crustacean and mollusc in marine environment showed that fish and crustacean accumulated the highest level of this element. It was also found that the specimen fish, which contain highest level of Hg contain, cluster of nematode parasites found in guts and flesh of fish which may be attributed with the feeding habit of fish which consists of crustaceans and molluscus. *Proteocephalus percae* and *Acanthocephalus lucii* were found in the polluted water fishes which contain heavy toxic metals like Pb, Cd, As, Cu and Zn (Turecekova *et al.*, 2002).

The dangerous concentration of the toxic arsenic that is found in surface water enhances the chances of alteration of genetic material of fish. This mainly caused by accumulation of arsenic in the bodies of plant eating fresh water organisms. Level of arsenic in Sea and seafood may be high because fish absorb As from the water. Eating of such type of fish can effect on human health such as irritation of stomach, intestine, decreased production of red and white blood cells, skin cancer, lung cancer, liver cancer and lymphatic cancer.

CONCLUSIONS

Investigation reveals that presence of a parasitic nematode in herbivorous fish due to heavy metal contaminated marine environment may lead to the death of fishes at Clifton beach where lot of fishes were die due

to oil pollution. These parasites were found to be persistent in heavy metal contaminated environment and can cause toxic effect on size, weight of fish and also threaten to human health.

REFERENCES

- Brotheridge, R.M., K.E. Newton and S.W. Evans, 1998. Presence of a parasite nematode (*Eustrongylidies* sp.) in brown trout from a heavy metal contaminated aquatic ecosystem. *Cemosphere*, 37: 2941-2934.
- Datta, D. and G.M. Sinha, 1989. Responses induced by long term toxic effects of heavy metals on fish tissues concerned with digestion, absorption and excretion. *Gegenbaurs, Morphol. Jahrb.*, 135: 627-657.
- Florence, T.M., G.M. Morrison and J.L. Stuber, 1992. Determination of trace element speciation and the role of speciation in aquatic toxicity. *Sci. Total Environ.*, 7: 125.
- Hassani, N., A.R. Hasami, M.F. Ghazami and N. Kasebi, 2004. Heavy metal concentration in the largest watershed Basin of east Uremieh lake, Iran. The Joint Agriculture and Natural Resources Symposium. Tabriz-Ganga, May 14-16.
- Hyslop, E., 1980. Stomach content analysis. A review of methods and their application. *J. Fish Biol.*, 17: 411-429.
- Khan, A.T, D.M. Forester and H.W. Mielke, 1995. Heavy metal contamination in two populations of crayfish. *Vet. Hum. Toxicol.*, 37: 426-428.
- Muir, D.C., R. Wagemann, B.T. Hargrave, D.J. Thomas, D.B. Peak and R.J. Norstrom, 1992. Arctic marine ecosystem contamination. *Sci. Total Environ.*, 122: 75-134.
- Olukova, D.K, S.I. Smith and M.O. Ilori, 1997. Isolation and characterization of heavy metals resistant bacteria from lagos lagoon. *Folia Microbiol.*, 42: 441-444.
- Sinha, A.K, P. Dasgupta, S. Chakrabarty, G. Bhattacharyya and S. Bhattacharjee, 2002. Bioaccumulation of heavy metals in different organs of some of the common edible fishes of Kharkai River, Jamshedpur. *Indian J. Environ. Health*, 44: 102-107.
- Snehalata, D., P.K. Sumil and B.K. Sahu, 2001. Biochemical changes induces by mercury in the liver of Panacie prawns *Penaeus indicus* and *P. monodon* from Rushikula estuary, east coast of India. *Indian J. Marine Sci.*, 30: 246-252.
- Tam, S.Y. and C.S. Mok, 1991. Metallic contamination in oyster and other seafood in Hong Kong. *Found. Addit Contamination*, 8: 333-342.
- Turecekova, L., V. Hanzelova and M. Spakulova, 2002. Concentration of heavy metals and its endoparasites in the polluted water reservoir in Eastern Slovakia. *Helminologia*, 39: 1-23

- Tenora, F., V. Barus, S. Kracmar and J. Dvoracek, 2000. Concentration of some heavy metals in *Ligula intestinalis* plerocercoids (Cestoda) and *Philmetra ovata* (Nematoda) compared to some their hosts (Osteichthyes). *Helminthologia*, 37: 15-18.
- Tenora, F., V. Barusi, S. Kracmar, J. Dvoracek and J. Srnkova, 1999. Parallal analysis of some heavy metals concentration in the *Anguillicola crassus* (Nematode) and European eel *Anguilla anguilla* (Osteichthyes). *Helminthologia*, 36: 79-81.
- Vir, K.S. and R.C. Sharma, 1999. Biochemical changes induced by nickel and chromium in the liver of *Cyprinus caripio*. *Polln. Res.*, 18: 217-222.