Journal of Mountain Research, Volume 10, 2015 (ISSN-0974-3030), pp 73-81

ATPase POISONING IN *CHANNA PUNCTATUS* EXPOSED TO CYFLUTHRIN AND THEIR RECOVERY RESPONSE.

DHEER PAL SINGH, VANDANA SHARMA AND NEERAJ KUMAR

Department of Zoology, MeerutCollege, Meerut 250001 (U.P.), INDIA

Email: dheerpal@gmail.com

Received: 7.12.2015 **Accepted: 21.12.2015**

ABSTRACT

The specific activities of Na^+-K^+ ATPase and Mg^{++}ATPase were investigated in the liver, kidney and muscles of a fresh water fish, *Channa punctatus* at the interval of 15 days and 30 days exposure to $1/5^{th}$ of 96h TL_m of Cyfluthrin, i.e., 0.00038 mg/l.The activities were found to be inhibited significantly. The recovery response of the adverse effects of the exposure was also carried out.The inhibition in the activity of Na^+-K^+ ATPase after 15 days exposure was 33.63%, 28.80% and 31.87% which was recovered after 15 days in toxicant free water up to the levels of 13.65%, 10.12% and 12.88% in liver, kidney and muscles, respectively and the activity of Mg^{++} ATPase was inhibited by 38.31%, 35.38% and 37.59% which was found to be recovered up to 14.49%, 12.54% and 14.18%in the liver, kidney and muscles respectively. The activity of Na^+-K^+ ATPase after 30 days exposure was inhibited to 48.86%, 38.24% and 46.28% and after 30 days in normal water that was recovered up to 15.31%, 11.84% and 15.14% and inhibition of Mg^{++} ATPase was found to be 58.39%, 53.43% and 55.75% and after recovery it was found to be 16.31%, 13.27% and 14.87% in liver, kidney and muscles respectively. The order of inhibition in the activity of ATPase was found to be liver>muscles>kidney and the order of recovery of the activity of ATPase was found to be kidney>muscles>liver.This alteration in the activity of ATPase may alter cellular metabolism which may in turn result in the alteration of physiology of the fish.

KEY WORDS: *Channa punctatus*, Cyfluthrin, liver, kidney, muscles, ATPase, recovery.

REFERENCES

Anjum, F. and M.K.J. Siddiqui, (1990). *In vitro* inhibition of fish (*Tilapia mossambica*) brain Ca^{2+}-ATPase by monocrotophos, dimethoate, diazinon and D.D.T. *Ind.J.Exptal. Biol.*, **28**, 488-489.

Bansal, S.K. and S.V. Chandra, (1985). The *in vitro* effect of chlordecone and mirex on Ca^{2+} activated ATPase in the teleost *Saccobranchusfossilis*. *Aquatic Toxicol.,***6**(1), 37-44.

Begum, G., (2009) Enzymes as Biomarkers of Cypermethrin Toxicity: Response of *Clariasbatrachus* Tissues ATPase and Glycogen Phosphorylase as a Function of Exposure and Recovery at Sublethal Level. *Toxicology Mechanisms and Methods*, **19**:29–39.

Begum, G., (2011) Organspecific ATPase and phosphorylase enzyme activities in a food fish exposed to a carbamate insecticide and recovery response. Fish Physiology and Biochemistry.**37**:61-69.

Begum, G.,(2011). Organ-specific ATPase and phosphorylase enzyme activities in a food fish exposed to a carbamate insecticide and recovery response. *Fish Physiology and Biochemistry.,***37**(1),61-69.

Chandravathy,V. Mary and S.L.N. Reddy, (1995). *In vivo* alterations in the tissues of *Anabas scandens* associated with sublethal lead nitrate toxicity and recovery responses during post-exposure period. *J. Environ. Biol.*, **16** (4), 301-304.

Chinoy, N.J.,(1991 a). Effects of fluoride on physiology of some animals and human beings. *Ind. J. Environ. Toxicol.*, **1** (1), 17-32.

Chinoy, N.J.,(1991 b). Effects of fluoride on some organs of rats and their reversal. *Proc. Zool. Soc., Calcutta,* **44** (1), 11-15.

Chitra, T., M.M. Reddy and J.V. RamanaRao,(1983). Levels of muscle and liver tissue enzymes in *Channapunctatus* (Bloch) exposed to NaF. *Fluoride.*, **16** (1), 48-50.

Dalela, R.C., M.C. Bhatnagar, A.K. Tyagi and S.R. Verma, (1978). Adenosine Triphosphatase activity in few tissues of a fresh water teleost, *Channagachua* following *in vivo* exposure to endosulfan. *Toxicology*, **11**, 361-368.

David, M., J. Sangeetha, E.R. Harish, J. Shrinivas and V.R. Naik, (2014) Deltamethrin induced alteration in Na^{+}, K^{+}, Mg^{++}, Ca^{++} associated ATPases activity in the freshwater fish *Cirrhinusmrigala*. *Int. J. Pure Appl. Zool.,* 2(**2**): 175-181,

El-Elaimy, I., Mohamed FathyFaragBayomy, AsmaaGalal-KhallafKhaled, Mohammed-Geba, G. Martínez-Rodríguez, J.M.Mancera, (2014) Development of sensitive molecular markers fordetecting the genotoxicity induced by two pyrethroids insecticides,Cypermethrin and permethrin, to the Mediterranean sole, *Soleasenegalensis*(Kaup, 1858). *J. App. Pharm. Sci.*,4 (02): 034-042.

*Fritz, P.J. and M.E. Hamrick, (1966). *Enzymol. ActaBiocat.*, **30**, 57.

Henry, R.J.D.C. and J.W. Winkelman, (1974). “Clinical Chemistry Principles and Techniques”, Harper and Row, 2nd Edition.

Peter, V.S.; G.S. Babitha, S.E. Bonga, and M.C. Peter, (2013). Carbaryl exposure and recovery modify the interrenal and thyroidal activities and the mitochondria-rich cell function in the climbing perch *Anabas testudineus* Bloch. *AquatToxicol.*, **126**, 306-313.

*Pullman, M.E., H.S. Penefsky, A. Datta and E. Racker, (1960). *J. Biol. Chem.*. 235.

Reddy, D.C.; V. Kalarani, and R.W. Davies, (1991). Tissue ATPase activity and recovery in the freshwater crab *Oziotelphusasenexsenex* exposed to a sublethal concentration of endosulfan for varying periods of time. *Comp BiochemPhysiol C*.,**99**(3), 431-435.

*Riedal, B.and G. Christenson, (1979). *Bull. Envioron. Contam. Toxicol.*, **23**, 365.

Sharma, R.M.,(1988). Effect of Endosulfan on Adenosine Triphosphatase (ATPase) Activity in liver, kidney and muscles of *Channagachua. Bull. Environ. Contam. Toxicol*., **41**, 317-323.

Sharma, V.; D.P. Singh, and M.C. Bhatnagar, (2010). Adenosin tri phosphatase poisoning in *Labeorohita* exposed to alpha cypermethrin. *Biosci. Biotech. Res. Comm*., **3**(1), 94-96.

*Skou, J.C., (1964). *Prog. Biophys.*, **14**, 131.

Verma, S.R., S.K. Bansal, A.K. Gupta and R.C. Dalela, (1979). Sensitivity of ATPase. System in certain tissues of *Labeorohita* and *Saccobranchusfossilis in vitro* treatment with chlordane. *Environ. Research*, **19**, 14-22.