International Journal of Applied and Universal Research **E-ISSN No: 2395-0269**
Volume III, Issue IV, July-Aug. 2016 Available online at: www.ijaur.com

IMPACT OF SUBLETHAL CONCENTRATION OF CARBOFURAN ON BIOCHEMICALS OF LIVER OF FRESH WATER FISH *CHANNA PUNCTATUS*

Muddassir Ahmad Thoker[1], Khan A.A.[2] and Sharma G.D[3]
1. **Research Scholar Department of Zoology, Devi Ahliya University Indore, M.P,**
2. **Professor of Zoology I.K Collage Indore**
3. **HOD Zoology PMB Gujrati College Indore**

ABSTRACT: - The objective of present study, an attempt was made to examine the sub lethal toxic effect of carbofuran insecticide on biochemical of liver of freshwater fish channa punctatus. The different biochemials including cholesterol, triglycerids, high density lipo proteins, low density lipoproteins and very low density proteins .The sublethal concentration were 0.1ml(1/5 of LC50) of carbofuran for which the fish were exposed at different time intervals of 7,14,21, and 28 days. The present study showed statistically significant increase in cholesterol, low density lipoproteins and very low density lipoproteins. On the other hand triglycerides and high density lipo proteins showed significant decrease.

KEYWORDS: Malathion, *Channa punctatus*, urea, creatinine and blood urea nitrogen Carbofuran,, liver, cholesterol, triglycerides, lipoproteins .

INTRODUCTION

Pesticides usage in the agricultural fields to control pests is extremely toxic to non-target organisms like fish and affects fish health through impairment of metabolism, sometimes leading to mortality. Kumari and subaisha (2010) Due to the biodegrability and short residue time in the environment, organophosphate pesticides are being increasingly used in recent years. carbamates are comparatively less toxic with lower degree of persistence in soil and water have find wide application as insecticide and nematicide. Because of their low persistence, repeated application of these two groups of pesticides is being practiced for control of pests in agriculture and thereby large quantites of these find their way into the water bodies.The pesticide selected in the present study are carbofuran. Carbofuran is a carbamate insecticide that acts by inhibiting the activity of acetyl cholinesterase carbofuran *(2, 3-dihydro-2, 2-dimethyl-7-benzofuranyl N-methyl carbamate)* is a broad spectrum insecticide in rice culture, especially for controlling brown plant hopper, a major insect pest of great concern in area of intensive cultivation of new high yielding rice varieties. Recently, an analog of carbofuran namely carbosulfan has been developed and recommended as a spray for use in an effective substitute for carbosulfan. There is considerable literature on the fate and persistence of carbofuran in soil and water environments (Rajagopal *et. al*., 1984). Bio chemicals are the accessible body contents for checking the toxicity of any chemical(singh and yadav 2010.) The results of such biochemical parameters results in serious outcome in the form of various diseases in fishes / animals and also reveals underlying physiological conditions of the organs / tissues of organism(obamanu et al 2009). The fish *Channa punctatus* is selected for the study because of its availability and commercial importance. The aim of the study is to investigate the effect of carbofuran malathion on liver biochemistry with particular reference to cholesterol, triglycerides and lipoproteins.

MATERIALS AND METHODS

The fresh water catfish, *Channa punctatus* was obtained from the local fish market of Indore. It was acclimatized in glass aquaria for two weeks prior to experimentation. The weight and length of the experimental animals varied between 55 – 65g and 14 – 20 cm respectively. The experiment was conducted in ten aquariums two was used for control and other aquaria used for the pollution study. Each aquarium contains ten fishes. The experimental fishes were exposed to sub-lethal concentration 0.1 ml (1/5 of LC50) of carbofuran at different time intervals 7, 14, 21 and 28 days. The acclimated fish were starved for 24 hrs prior to their use in the experiment and were not fed during the course of experiment. Dalela et al (1981). The water was changed after every 24 hrs. The fishes were killed by striking blow on the head and dissected to remove the liver for biochemical estimation. The LC50 of carbofuran was calculated by probit analysis of Finney(1997).The liver was used for biochemical estimation of Cholesterol estimated by Wybenga*et al.* Method(1970). Triglycerides (TG) estimated by McGowan Method (1983).High Density Lipoprotein (HDL) estimated by Warnick*et al.* Very Low Density Lipoprotein(VLDL) estimated by Fried Wald Method (1972). Low Density Lipoprotein(LDL) – Calculated value

RESULTS AND DISCUSSION.

channa punctatus exposed to concentrations of 0.1 ml of carbofuran exhibit many biochemical alterations (liver) have been summarized in tables In the experimental animals after carbofuran sub lethal intoxication shows an increasing as well as decreasing trend after different time intervals(7,14,21,28days). In the present findings Elevated changes have been found in cholesterol, low density lipoproteins and very low density lipoproteins. It may be due to liver dysfunction, enhanced cholesterol production and cholestasis occurring in liver with liberation cholesterol in the blood serum by liver cell damage under carbofuran stress. It is linked with greater risk of coronary artery disease. On the other hand decreasing trend in triglycerides and high density lipoproteins because of liver cirrhosis, affecting synthesis of TG due to reduced glucose availabity in treated fish is essential for TG synthesis because it form glycerophosphate which is the precursor of glycerol with fatty acids and toxicant may blockage of TG secretion in to blood. The present findings gain support with Perrier *et al*. (2014) reported high cholesterol level due to cholestasis and liver damage by pesticidal activity on rainbow trout *Salmo gairdneri*. Singh et al. (1997) resulted cholesterol activity increased in both tissue (liver and kidney) in fish *channa punctatus* exposed to the highest concentration of fertilizer di-ammonium phosphate. Austin (1991)found higher levels of LDL in *clarias batrachus* due to pesticidal stress.Blinski and Lau (2009) reported decrement of triglyceride level in *salmo gairdneri* due to liver cirrohosis affecting TG Synthesis. Trenkwalder *et al.* (2000) showed decreased plasma concentrations of LDL due to renal disease by pesticide. Verma (2012) also found higher levels of VLDL in *Clarias batrachus* and *Heteropneustes fossilis* due to rogor and endosulfan toxicity. Jyothi and narayan (2001) explained cholesterol increased level possible liver damage due to carbaryl and phorate stress.

CHOLESTEROL
TABLE -1

Cholesterol content of *Channa punctatus* exposed to sub lethal concentration of carbofuran

Biochemical parameter	Control group Range Mean ±S.Em	Exposure in days			
		7 days range Mean ±S.Em	14 days range Mean ±S.Em	21 days range Mean ±S.Em	28 days range Mean ±S.Em
Cholesterol (mg/dl)	15.7-17.35 16.3± 0.31	17.55-19.43 18.67±0.36*	19.64-21.56 20.42±0.38*	22.17-25.32 23.77±0.44**	26.36-29.47 28.25.30±0.56***

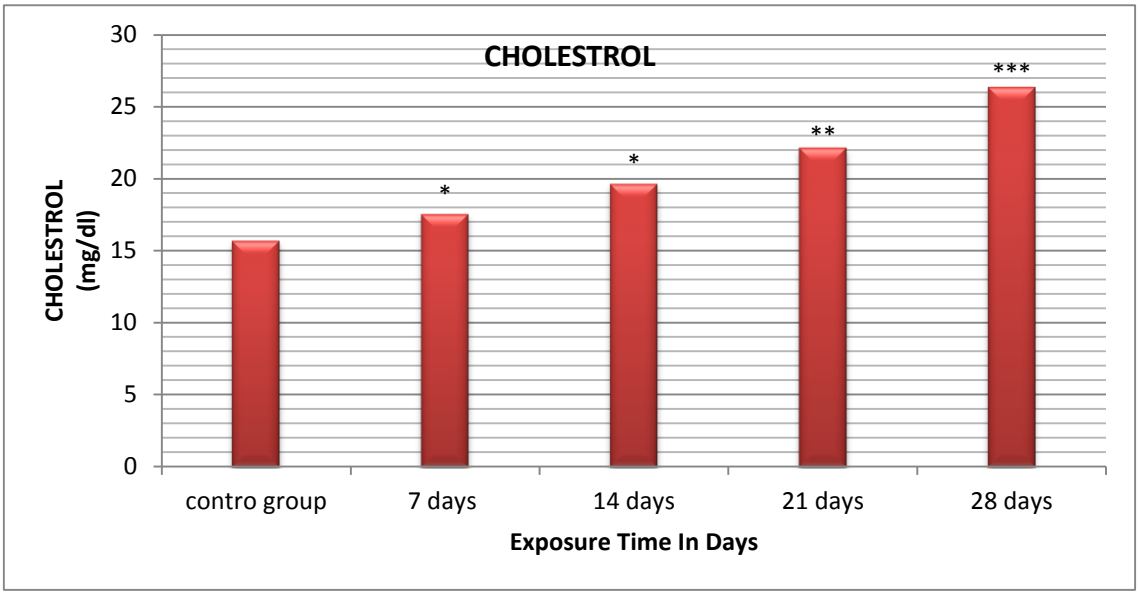

FIGURE -1Biochemical estimation of cholesterol after cabofuran intoxication in experimental fish *Channa punctatus*

TABLE-2
TRIGLYCERIDES

Triglycerides content of *Channa punctatus* exposed to sub lethal concentration of carbofuran.

Biochemical parameter	Control group Range Mean ±S.Em	Exposure in days			
		7 days range Mean ±S.Em	14 days range Mean ±S.Em	21 days range Mean ±S.Em	28 days range Mean ±S.Em
Triglycerides (mg/dl)	32.42-34.77 33.51± 1.21	31.42-33.22 32.36±0.96^{NS}	29.82-32.57 31.11±0.91*	28.47-31.77 29.31±0.85**	26.07-29.67 28.11±0.75***

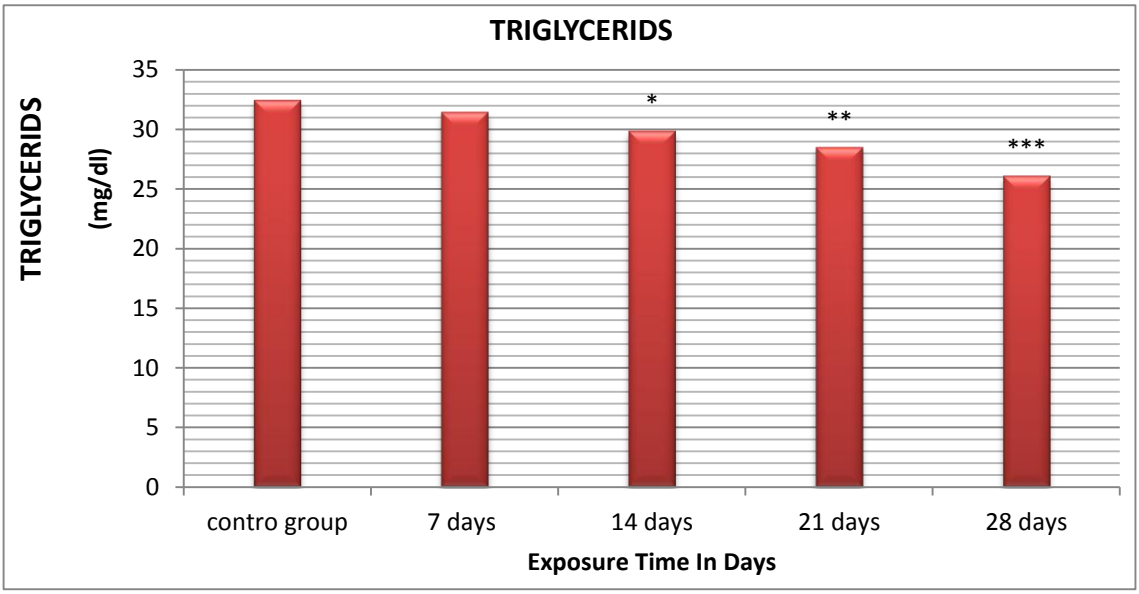

FIGURE – 2 Biochemical estimation of triglycerides after cabofuran intoxication in experimental fish *Channa punctatus*

TABLE -3

HIGH DENSITY LIPOPROTEIN

High density lipoprotein content of *Channa punctatus* exposed to sub lethal concentration of carbofuran.

Biochemical parameter	Control group Range Mean ±S.Em	Exposure in days			
		7 days range Mean ±S.Em	14 days range Mean ±S.Em	21 days range Mean ±S.Em	28 days range Mean ±S.Em
HDL (mg/dl)	15.70-19.90 17.75± 0.65	14.40-18.20 16.25±0.92**	12.54-16.88 14.57±0.85**	11.55-15.47 13.37±0.81***	09.76-13.88 11.21±0.79***

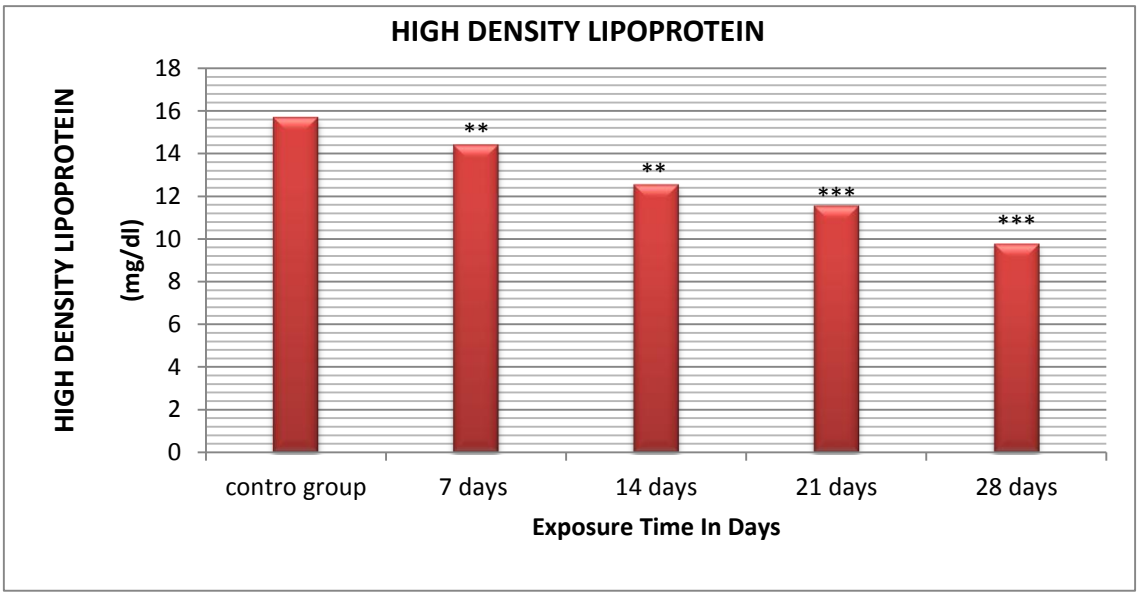

FIGURE - 3Biochemical estimation of high density lipoprotein after cabofuran intoxication in experimental fish *Channa punctatus*

Table -4

LOW DENSITY LIPOPROTEIN

Low density lipoprotein content of *Channa punctatus* exposed to sub lethal concentration of carbofuran.

Biochemical parameter	Control group Range Mean ±S.Em	Exposure in days			
		7 days range Mean ±S.Em	14 days range Mean ±S.Em	21 days range Mean ±S.Em	28 days range Mean ±S.Em
LDL (mg/dl)	9.86-12.20 11.35± 1.01	9.10-11.55 10.68±0.93*	8.87-11.00 9.73±0.87**	7.57-9.87 8.68±0.76**	7.10-8.75 7.97±0.58***

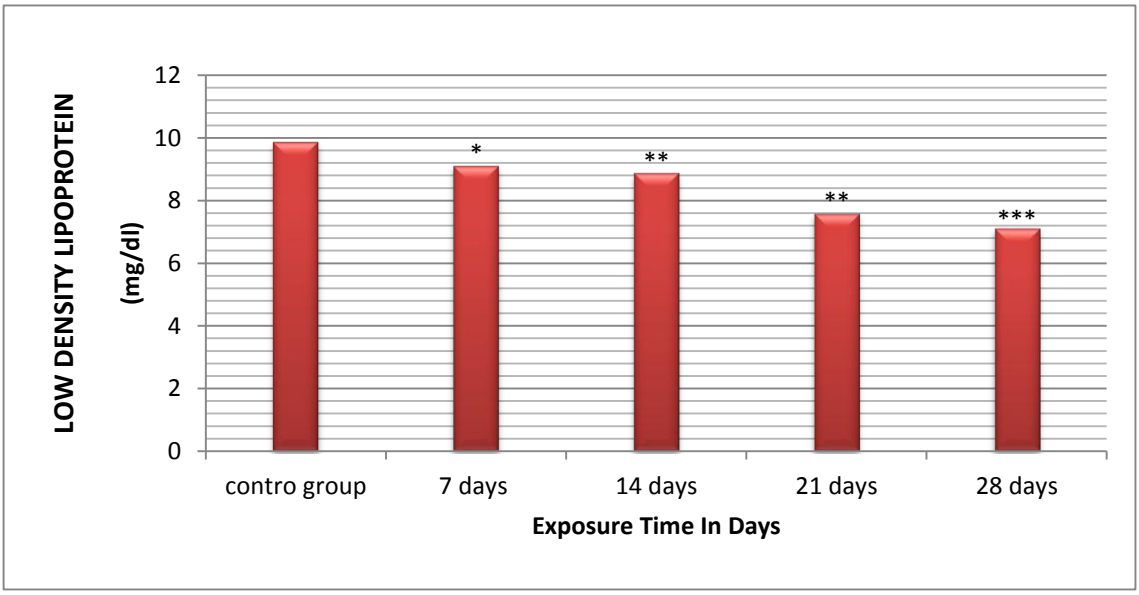

FIGURE -4 Biochemical estimation of low density lipoprotein after cabofuran intoxication in experimental fish *Channa punctatus*

TABLE- 5
VERY LOW DENSITY LIPOPROTEIN

Very low density lipoprotein content of *Channa punctatus* exposed to sub lethal concentration of carbofuran.

Biochemical parameter	Control group Range Mean ±S.Em	Exposure in days			
		7 days range Mean ±S.Em	14 days range Mean ±S.Em	21 days range Mean ±S.Em	28 days range Mean ±S.Em
VLDL (mg/dl)	13.22-17.09 15.82± 0.46	11.47-16.38 14.79±0.52*	10.34-14.46 12.88±0.65*	9.77-12.23 11.36±0.47*	8.79-10.42 9.54±0.43***

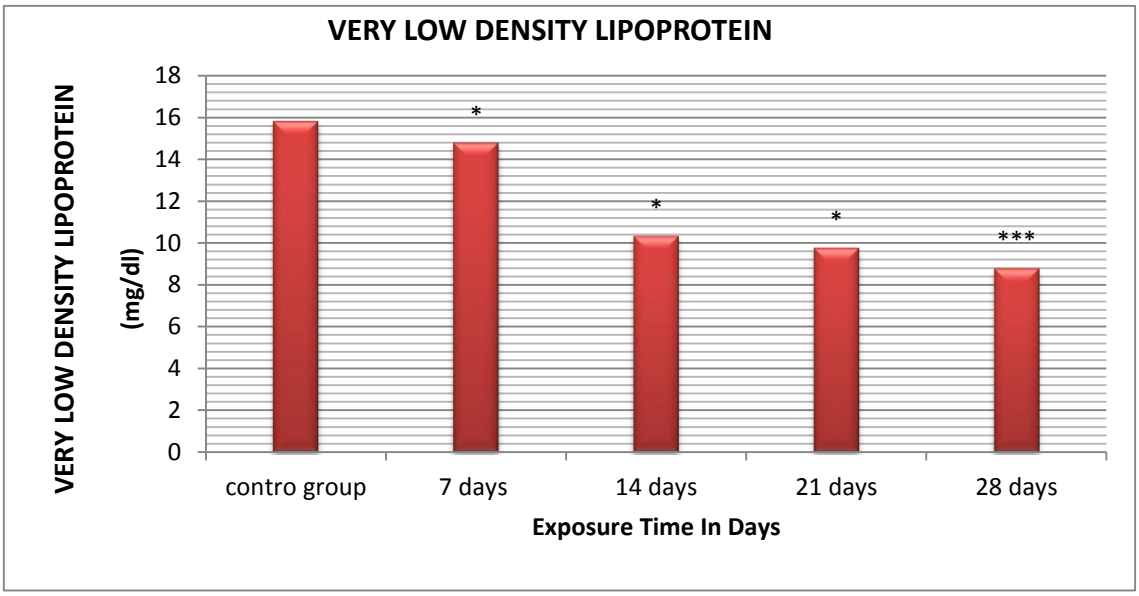

FIGURE – 5 Biochemical estimation of very low density lipoprotein after cabofuran intoxication in experimental fish *Channa punctatus*

CONCLUSIONS

In the present study after sub lethal exposure of carbofuran on fresh water fish *Channa punctatus* shows increasing trend of cholesterol, low density lipoproteins and very low density lipoproteins after different time intervals It may be due to liver dysfunction, enhanced cholesterol production and cholestasis occurring in liver with liberation cholesterol in the blood serum by liver cell damage under carbofuran stress. On the other hand decreasing trend in triglycerides and high density lipoproteins because of liver cirrhosis, affecting synthesis of TG due to reduced glucose availabity in treated fish is essential for TG synthesis because it form glycerophosphate which is the precursor of glycerol with fatty acids and toxicant may blockage of TG secretion in to blood.

REFERENCES

1. Austin, M.A. (2006) ; Plasma triglyceridis and coronary heart disease . Arterioscler Thromb;
2. Bilinksi, E., V.C. Lau, (2009). Lipolytic activity toward long chain triglycerides in lateral line muscle of rainbow trout *(Salmo garidneri*). L. Fish. Res. Bd. Can., 26; 1857- 1866 11:2:14.
3. Finney D.J., Probit analysis 3rd edn, Cambridge University press, Cambridge, 20, (1997).
4. Fredickson DS. Estimation of concentration of low density lipoprotein in plasma without use of the preparative ultracentrifuge. Clin chem 1972; 18: 499-502. n Chem;16;980.
5. Jyothi,B. and G.Narayan(2001):Effect of pesticides carbaryl and phorate on serum cholesterol level in fish , *Clarias batrachus(*Linn.).J.Environ.Biol; 18:137-140.
6. McGowan MW, Artiss JD, Strandbergh DR, Zak B. A peroxidase-coupled method for the colorimetric

determination of serum triglycerides. Clin hem 1983; pp:538-542.

7. Obomanu F.G., Gabriel U.U. and Emetonjor J.N., Biomarker enzymes in muscle tissue and organs of *Clarias gariepinus* after intramuscular injection with aqueous extracts of Lepidagathis alopecuroides leaves, *Journal of Medicinal Plants Research*, **3**, 995_1001 (2009
8. Kumari, S.B. and M.C. Subisha. 2010. *The Ekol*., Vol. 10, no. 12, p. 83-88.
9. Perrier H.,C. Perrier, I. Gudefin, and A. Gras,(2014) : Adrenaline induced hypercholesterolemia in the rainbow trout *Salmo gairdneri*, a separate study in male and female trout and the effect of adrenergic blocking agents. Comp. Biochem. Physiol., 4(2): 341 – 347.
10. Rajagopal, B.S., G.P. Brahmaprakash, B.R. Reddy, U.D. Sing, N. Sethunathan (1984).Effect and persistence of selected carbamate pesticides in soil. *Residue Rev*., (93): 1-207.
11. Singh P.A. and Yadav K, Toxic effect of phorate on the serum biochemical parameters of the snake head fish *Channa puncatus* (Bloch), *Advances in Bioresearch*, **1**, 177_ 181 (2010).
12. Singh,N.N;V.K.Das and A.K.Srivastava(1997):Chro nic toxicity of propoxur on carbohydrate,protein and serum electrolyte levels in catfish, *Heteropneusts fossils*.Biomed.Environ.Sec; 10:408-414.
13. Trenkwalder, E., A. Gruber, P. Konig, H. Dieplinger, F. Kronenberg (2013): Increased plasma concentrations of LDL-unbounded apo (a) in patients with end stage renal disease. Kidney Int., **52**: 1985 – 1692.
14. Verma, P.C. (2012): Altered biochemical profile of carbohydrate, mprotein and triglycerides in *Clarias batrachus* and *Heteropneustes fossilis* due to rogor and endosulfan toxicity. Journal of Ecophysiology and occupational Health.**7**:10– 18.
15. Warnick GR, Ngugan T, Albers A. A comparison of improved precipitation methods for quantification of high density lipoprotein cholesterol. Clin chem 1985; 31: 217-22.
16. Wybenga DR, Pileggi VJ, Dirstine PH, Di Giorgio J. Direct manual determination of serum total cholesterol with a single stable reagent. Clin chem 1970; 12: 980-984.