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

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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 biochemicals 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 biodegradability 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 aquaria 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 Warnicket 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, 28 days). 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 availability 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 cirrhosis 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

<table>
<thead>
<tr>
<th>Biochemical parameter</th>
<th>Control group Range Mean ±S.Em</th>
<th>Exposure in days</th>
<th>7 days range Mean ±S.Em</th>
<th>14 days range Mean ±S.Em</th>
<th>21 days range Mean ±S.Em</th>
<th>28 days range Mean ±S.Em</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>15.7-17.35 16.3± 0.31</td>
<td></td>
<td>17.55-19.43 18.67±0.36</td>
<td>19.64-21.56 20.42±0.38*</td>
<td>22.17-25.32 23.77±0.44**</td>
<td>26.36-29.47 28.25±0.56***</td>
</tr>
</tbody>
</table>

**FIGURE -1**

Biochemical estimation of cholesterol after carbofuran intoxication in experimental fish *Channa punctatus*
TABLE 2

TRIGLYCERIDES

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

<table>
<thead>
<tr>
<th>Biochemical parameter</th>
<th>Control group</th>
<th>Exposure in days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range Mean ±S.Em</td>
<td>7 days range Mean ±S.Em</td>
</tr>
<tr>
<td>Triglycerides (mg/dl)</td>
<td>32.42-34.77 33.51± 1.21</td>
<td>31.42-33.22 32.36±0.96 NS</td>
</tr>
</tbody>
</table>

FIGURE – 2 Biochemical estimation of triglycerides after carbofuran 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.

<table>
<thead>
<tr>
<th>Biochemical parameter</th>
<th>Control group</th>
<th>Exposure in days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range Mean ±S.Em</td>
<td>7 days range Mean ±S.Em</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td>15.70-19.90 17.75± 0.65</td>
<td>14.40-18.20 16.25±0.92 NS</td>
</tr>
</tbody>
</table>
FIGURE - 3 Biochemical estimation of high density lipoprotein after cabofuran intoxication in experimental fish *Channa punctatus*

**Table - 4**

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

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

FIGURE - 4 Biochemical estimation of low density lipoprotein after cabofuran intoxication in experimental fish *Channa punctatus*
TABLE 5

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

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

![Graph of Very Low Density Lipoprotein](image_url)

**FIGURE – 5** Biochemical estimation of very low density lipoprotein after carbofuran 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 availability 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**

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