

# Toxic Impact of Carbaryl on Protein, Albumin and Globulin Level in Broiler Chicks Fed Different Levels of Carbaryl

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## Abstract

This study investigated impact of carbaryl on total protein, albumin and globulin level in broiler chicks. Broiler chicks were used in the study and the animals were divided in four groups: one control and three experimental groups. Carbaryl was added into diet of experimental broiler chicks at three different doses, low (15mg/kgb.w.), intermediate (20mg/kgb.w.), and high (25mg/kgb.w.) for 21 days. Blood from wing vein was analyzed for total protein, globulin and albumin. Total protein content was significantly increased  $p<0.005$  in low dose as compared to control but statistically insignificant increase was found in intermediate dose and in high dose group. Globulin content shows insignificant ( $p>0.005$ ) increase in low dose and in high dose as compared to control but was similar to control in intermediate dose. The albumin level shows statistically significant ( $p<0.005$ ) increase in low dose group but statistically insignificant increase was found in medium dose and in high dose.

**Keywords:** carbaryl; protein, albumin; globulin; broiler chicks

## Introduction

In the last few decades, the World wide attention is focusing on the environment and how to protect it. The fragmented and incomplete studies on the toxicological action of pesticides necessitated this study to investigate the toxicological effects of carbaryl in broiler chicks. Pesticides have contributed from one side to dramatic increase in crop yields, and from the other side they may induce adverse ecotoxicological and hazardous health effects on a variety of living organisms, including birds. As birds have a high trophic level, they are vulnerable of accumulating large dosage of certain chemicals (Deka and Borah, 2008). Some sub-lethal effects of pesticides were studied in birds with a view to identify characteristic biochemical response that may be useful for the monitoring of exposure to sub-lethal levels in the field (Dahamna et

al., 2004). Clinical symptoms accompanying exposure of birds to sub-lethal dose of a pesticide cited depression, reduced feed intake and dullness.

Carbaryl is a carbamate effective against a broad range of insects, mites, lice, millipedes and other pests. It is used in a diverse range of situations encompassing agricultural crops, veterinary treatment of commercial and companion animals and birds, and the home garden. Some of these pests have also been shown to be capable of transmitting leucosis a disease of poultry (Draper, 1967). Human and animals can be directly exposed to pesticides by inhalation, ingestion, contact with skin and eyes. Apart from the direct exposure, indirect exposure occurs in animals by consuming prey that contains high residues of the pesticides (Caroline, 1991). Chickens are especially vulnerable to pesticide toxicity because poultry houses and birds are dusted with pesticides. Exposure of poultry to chemical pesticide causes

health consequences to poultry culminating in great economic loss, while also posing a potential threat to public health due to the presence of pesticide residues in poultry meat.

This study is therefore targeted at identifying the effects of carbaryl on the total protein, globulin and albumin level of broiler chicks.

## Material And Method

**Experimental Animals:** Twenty day-old broiler chicks (*Gallus gallus*) of weight ranging from 25-30 gm. were used in the experiment. Broiler Chicks were quarantined for 10 days and it was confirmed that they were free of pathogen and any other disease.

Broiler Chicks were kept in conventional condition (open system) and housed in stainless steel cages (800×14cm<sup>2</sup>) in animal house with room temperature 22±3°C, relative humidity 50-70%, photo period of 12 hrs. Light and 12 hrs. Dark. They were provided with commercial broiler chick starter diet and water *ad libitum*. The study was conducted at Laboratory of Reproductive Biology D.G. College Kanpur and Central Drug Research Institute (CDRI) Lucknow.

**Experimental Procedure:** The Chicks were distributed into four groups: one control group and three treated groups i.e. Low, Intermediate, and High dose. Chicks were distributed so as the average body weight of each group remains approximately same. Control group was fed on the basal diet (commercial broiler chick starter diet) while all treated groups was

supplemented with 15mg/kg b.w., 20mg/kg b.w. and 25mg/kg b.w. of carbaryl for 21 days.

**Biochemical Analysis:** The cardiovascular blood was taken for biochemical analysis. The blood was allowed to clot and was subjected to centrifugation at 2500rpm for twenty minutes. The serum obtained was analyzed in BECKMANN Synchron Clinical System CX4/CX5, USA, for the following parameters by using different kits in various wavelengths.

**Total Protein:** Serum total protein concentration was determined as mg/dl by using AutoZyme Kits at 530-570nm wavelength.

**Globulin:** Serum total globulin concentration was determined as mg/dl by using AutoZyme Kits.

**Albumin:** Serum albumin concentration was determined as mg/dl by using QANAMOL Kits at 700-600nm wavelength.

**Statistical Analysis:** Statistical analyses were performed using STATGRAPHICS 3.0 software. The data were analyzed using one-way

ANOVA test. Results were presented as mean $\pm$ SE. The significance of difference among the groups was assessed using students t-test. Significance was set as  $P<0.05$ ,  $P<0.01$  and  $P<0.001$ .

## Results

**In Table-1, Graph-1(a)**, the total protein level shows statistically significant ( $p<0.005$ ) increase in low dose group but statistically insignificant increase was found in medium dose and in high dose as compared to their respective control group.

On comparing with control, the globulin content shows insignificant ( $p>0.005$ ) increase in low dose and in high dose as compared to control but was similar to control in intermediate dose **Table-1, Graph-1(b)**.

**In Table-1, Graph-1(c)**, the albumin level shows statistically significant ( $p<0.005$ ) increase in low dose group but statistically insignificant increase was found in medium dose and in high dose as compared to their respective control group.

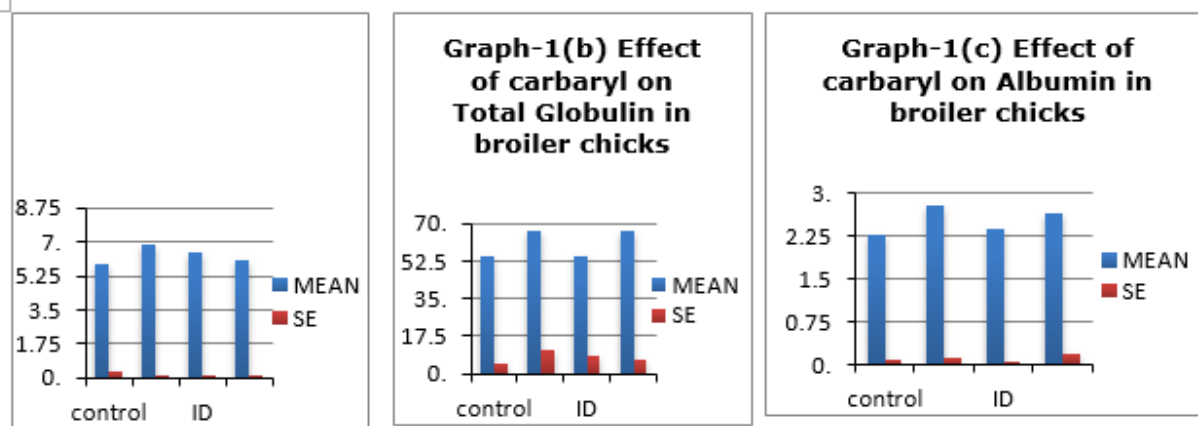
Parameters	Control	Low dose	Intermediate dose	High dose
Total Protein (g/dl)	5.86 $\pm$ 0.30	6.82 $\pm$ 0.07**	6.44 $\pm$ 0.08	6.08 $\pm$ 0.11
Globulin (g/dl)	54.6 $\pm$ 5.01	66.4 $\pm$ 11.47	54.8 $\pm$ 8.07	66.6 $\pm$ 6.27
Albumin (g/dl)	2.26 $\pm$ 0.08	2.78 $\pm$ 0.11**	2.38 $\pm$ 0.02	2.64 $\pm$ 0.17

Values are mean of three experiments  $\pm$  SEM with 5 chicks in each group.

Those marked with asterisks differ significantly from the control values

\* $P<0.05$ , \*\* $P<0.01$ , \*\*\* $P<0.001$  (by ANOVA test).

**Table:1:** Biochemical changes (Mean $\pm$ S.E.) in broiler chicks exposed to different doses of Carbaryl (n=5)



## Discussion

The pesticides tend to become concentrated as they move up the food chain they accumulate in the organism body (target and non-target organism) which content them. The pesticides don't kill the individual birds but often do affect their bodies and also affect birds physiological functions. Human and animals are exposed to different levels of pesticides as a result of the use of pesticides to control rodents in homes and offices, and ectoparasitic infestations in animals (Martin *et al.*, 2003).

There was statistically significant ( $p<0.005$ ) increase in low dose group but statistically insignificant increase of protein was found in medium dose and in high dose groups. Globulin content shows insignificant ( $p>0.005$ ) increase in low dose and in high dose group. Albumin level shows statistically significant ( $p<0.005$ ) increase in low dose group but statistically insignificant increase was found in medium dose and in high dose. Contrary to this cypermethrin was found to suppress serum globulins, gamma globulins and specific haemagglutination-inhibition (HI) and ELISA antibodies in chickens (Khurana *et al.*, 1998). Significant decrease

in total protein, albumin and globulin was found in quails when treated with Malathion (Mahmoud *et al.*, 2012). Increased blood urea in rats following exposure to monocrotophos was reported (Adilaxamma and Reddy, 1995). Nicolaus and Lee (1999) observed the effect of organophosphate and carbamates on black bird in filed conditions, they also reported inhibition in cholinesterase activity.

Tayyaba *et al.* (1981) reported that metasystox (an organophosphate) decreased the level of RNA in the cerebrum and protein in the cerebellum and spinal cord. Das and Mukherjee (2000) indicated that toxicants may cause stress-mediated mobilization of protein to cope with the detrimental condition so imposed. The protein so mobilized is one of the strategies employed to meet the energy required to sustain increased physical activity, biotransformation and excretion of the toxicants. Increase in total protein could be related to the action of carbaryl on nucleic acids (Devi, 1981).

It may be concluded that the observed increase in serum globulin may be due to inflammation in the body, acute infection, and chronic liver disease.

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