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Histopathological Changes in the Liver of Broiler Chicks Fed Different Levels of Carbaryl

[1]Sabina Khanam, [1]Eshita Pandey, [2]Amita Dixit and [1]Anjali Srivastava

The present study showed the effects of different levels of carbaryl on broiler chicks. Their residual effects are long lasting and the impact on food chains and ecosystems quite huge. This posed as the backdrop for this study. Liver were selected for the histopathological study. The study focused on the impact of different levels of carbaryl on the histopathology of liver because liver is the main governing organ for body metabolism. Twenty broiler chicks were taken for the present study and divided into four groups. One group was taken as control and three as treated groups. Treated groups were fed with three different doses of carbaryl as 15 mg kg^{-1} b.wt. (low dose), 20 mg kg^{-1} b.wt. (intermediate dose) and 25 mg kg^{-1} b.wt. (High dose) for 21 days. Histopathological changes like mild fatty infiltration was seen in low dose treated group but necrosis and focal collection of lymphocytes in the hepatic plates of liver were seen in intermediate and high dose treated groups as compared to control. Study proved beneficial in relating histopathology of liver with exposure to pesticides namely carbaryl.

Key words: Liver, histopathology, carbaryl, broiler chicks

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Sabina Khanam
Department of Zoology,
D.G.P.G. College,
Kanpur, India

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[1]Department of Zoology, D.G.P.G. College, Kanpur, India
[2]Department of Zoology, D.A.V. College, Kanpur, India

INTRODUCTION

Pesticides are major contaminants of our environment and many persist in the environment including in various feeds and foodstuffs. Poultry houses and birds of poultry are especially vulnerable to pesticide toxicity because poultry houses and birds are dusted with pesticides. Carbaryl is dusted over poultry birds to keep them free from pests such as ticks and mites. The regular sweepings and screenings from government depots that are sold as poultry feed may be contaminated with pesticides and treated poultry have been declared unfit for human consumption. 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.

Carbaryl is a member of the widely used carbamate pesticides. Like most carbamates, carbaryl acts as an inhibitor to cholinesterase, one of many important enzymes in the nervous systems of humans, vertebrates and insects (Extoxnet, 2000). Carbaryl is absorbed through skin and ends up in a variety of tissues and organs. Scientists from the Institute of Agricultural Medicine (Poland) showed that carbaryl applied to skin of laboratory animals ended up in the liver, blood and brain (Tos-Luty *et al*., 2001).

This study is therefore targeted at identifying the effects of carbaryl on the histopathology of liver on broiler chicks because liver is the main governing organ for body metabolism.

MATERIALS AND METHODS

Twenty broiler chicks (*Gallus gallus*) of weight ranging from 25-30 g. were used in the experiments. Broiler chicks were perchased from Gajaria farm, Lucknow. The experiment was conducted in the Laboratory of Reproductive Biology, D.G. College, Kanpur and Central Drug Research Institute, Lucknow. Broiler Chicks were quarantified 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 (800×14 cm^2) in animal house with room temperature 22±3°C , relative humidity 50-70%, photo period of 12 h. Light and 12 h dark. They were provided with commercial broiler chick starter diet and water *ad libitum*.

Experimental design: The chicks were randomly and equally distributed into four equal groups. The control group received feed without Carbaryl. The second low dose group was given carbaryl at 15 mg kg^{-1} b.wt., the third intermediate dose group were given carbaryl at 20 mg kg^{-1} b.wt. and the fourth high dose group were given carbaryl at 25 mg kg^{-1} b.wt. in the feed for 21 days. At the end of the experiment the liver of broiler chick were dissected out for further analysis. Liver after being removed from broiler chick were rinsed in saline solution for 2-3 times to remove any blood debris attached on the external surface. Then the liver tissue was cut into small pieces of approximately 4-5 mm and was collected in formal saline solution. Paraffin embedded tissue was sectioned to 5μ thickness and stained by haematoxylin and eosin for histopathological examination.

RESULTS

Liver of control birds showed normal structure of central vein, hepatic sinusoids, endothelium, portal vein, sinusoids and kupffer cells which was influenced by the administration of different doses of carbaryl (Fig. 1a). Following exposure to low dose (15 mg kg^{-1} b.wt.) (Fig. 1b) mild fatty infiltration was found in the liver as compared to their respective control.

Birds exposed to intermediate dose (20 mg kg^{-1} b.wt.) (Fig. 1c) of carbaryl showed focal necrosis with focal collection of lymphocytes in the hepatic plates as compared to their respective control but central vein, hepatic sinusoids, endothelium, portal vein and kupffer cells were show normal structure in intermediate dose treated group as compared to their respective control.

Birds exposed to high dose (25 mg kg^{-1} b.wt.) (Fig. 1d) of carbaryl showed focal necrosis with focal collection of lymphocytes in the hepatic plates as compared to their respective control but central vein, hepatic sinusoids, endothelium, portal vein and kupffer cells showed normal structure in high dose treated group as compared to their respective control.

DISCUSSION

Carbaryl fed birds showed focal necrosis with focal collection of lymphocytes in the liver of intermediate and high dose treated groups but their was no any change was found in the liver of low dose treated group. Contrary to our results Fenvalerate, another alpha cyano pyrethroid is reported to cause degenerative and necrotic changes in liver of chicken (Misri *et al*., 1994). Coles (1986) seen hepatic damage in broiler chicks fed Thiram.

Broilers fed chlorpyriphos showed congestion and haemorrhages of liver, lung, intestine and thigh muscles (Yadav *et al*., 2003). The gross lesions observed in

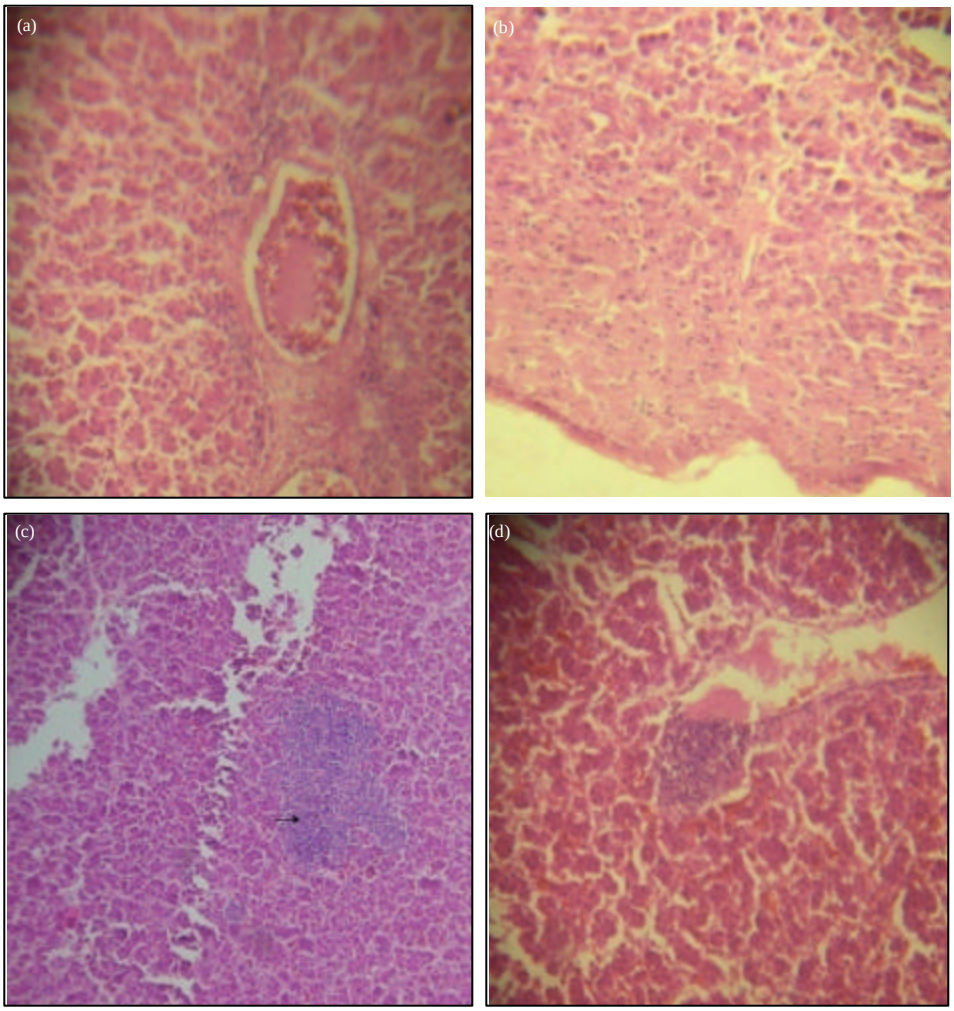

Fig. 1(a-d): (a) Section of liver tissue from control group showing normal architecture. HXE, 100X (b) Section of liver tissue from carbaryl administered (Low dose) broiler chicks showing mild fatty infiltration.HXE, 100X (c) Section of liver tissue from carbaryl administered (Intermediate dose) broiler chicks showing necrosis with focal collection of lymphcytes. HXE, 100X (d) Section of liver tissue from administered (High dose) broiler chicks showing necrosis with focal collection of lymphocytes. HXE, 100X

chlorpyriphos-fed birds were pale and enlarged liver which was in concurrence with the findings of various workers (Mehta *et al*., 2003). Similar results were observed in goats by Kaur *et al*. (1999).

CONCLUSION

The study showed alarming effects on histopathology of liver following treatment with carbaryl. The liver tissue showed major damage including necrosis, collection of lymphocytes as well as fatty infiltration. The study also directed towards the extension of observation period as acute exposure study. Results from chronic exposure may make the study more exhaustive and clear.

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