

# Histopathological alterations in Aflatoxicity and its amelioration with herbomineral toxin binder in broilers

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## Abstract

An experiment was conducted to study the protective role of herbo-mineral toxin binder product in induced aflatoxicosis in broilers on the basis of histopathological studies. Total sixty day old broiler chicks of either sex were randomly divided into three groups, each comprising of twenty birds and two replicates. Healthy birds of group I were supplemented with standard basal ration as per NRC (1994), group II birds were fed with standard feed mixed with aflatoxin B1 @ 1ppm, group III birds were fed with mycotoxicated feed of 1 ppm aflatoxin B1 and medicated with Toxiroak (M/s Ayurved Ltd, Baddi, India) @ 0.125%. Forty percent of birds were sacrificed at sixth week for necropsy examination. Microscopically, congestion of liver parenchyma, cytoplasmic vacuolation/fatty change of hepatocytes and renal tubules, necrosis, mononuclear cell infiltration was observed in aflatoxicated group II. Milder form of pathological lesions in treatment groups birds reveal pallor discoloration of liver and hepatomegaly, splenomegaly and mild lesion in kidneys. Present study revealed that supplementation of herbomineral toxin binder product could ameliorate aflatoxicity in broilers.

**Key words:** Aflatoxicosis, Broiler, Histopathology, Toxin binder, Herbal.

## Introduction

Aflatoxins (AF) are a group of heterocyclic toxic metabolites of toxigenic fungi *Aspergillus flavus* and *A. parasiticus*. These mycotoxins produces deleterious effects grossly and histopathologically on liver, spleen, kidney and other vital organs which leads to decreased growth and performance in poultry Sandhu et al. (2005). AF in broiler chicken has been widely investigated as carcinogenic, mutagenic, teratogenic (Wild, et al. 2000; Sur and Celik, 2003) and pathological lesion in poultry by Kiran, et al. (1998). Chronic toxicity in those birds is characterized by loss of weight, decline in feed efficiency, drop in egg production and increased susceptibility to infections. The incidence of hepatocellular tumors, particularly in poultry, is considered to be one of the serious consequences of aflatoxicosis (Dalvi, 2005). Aflatoxicosis in poultry is primarily a disease of liver and it showed typical lesions on it, which ultimately cause production problems and mortality. Aflatoxicosis affects mainly liver and kidney which leads to jaundice, generalized edema, hemorrhages, tan or yellow colour discoloration of liver, periportal necrosis

with bile duct proliferation and fibrosis and depletion of lymphoid organs (Charlton, et al. 2006). Gross pathological investigation may reveal a swollen and yellowish fatty liver with hemorrhages on its surface and swelling of kidney while histopathological changes reveal disorganization of hepatic structure (dystrophy) and a severe necrosis of parenchyma cells (fatty necrosis infiltration) accompanied by a proliferation of bile vessels (Rosa et al. 2001). The toxic effects of Aflatoxins (AFB1) are mainly localized in liver as manifested by hepatic necrosis, bile duct proliferation, icterus and hemorrhages.

## Materials and Methods

Sixty day old "Hubbard" starightrun broiler chicks were randomly divided into three groups with 20 birds in each group. Chicks were fed with pre-starter, starter and finisher diet during 1st, 2nd-3rd and 4th-6th week, respectively. Pure culture of *Aspergillus parasiticus* NRRL-2999 strain obtained from National Research Laboratory, Peoria, USA, was sub-cultured was used for production of aflatoxin on rice as described by Shotwell et al. (1966). Group I comprised of healthy

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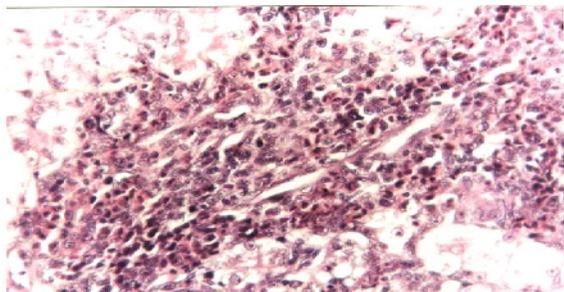


Fig.1 Section of liver showing massive fatty changes, biliary hyperplasia and heterophil infiltration in 1ppm AFB<sub>1</sub> (Group II) (H&E x 500)

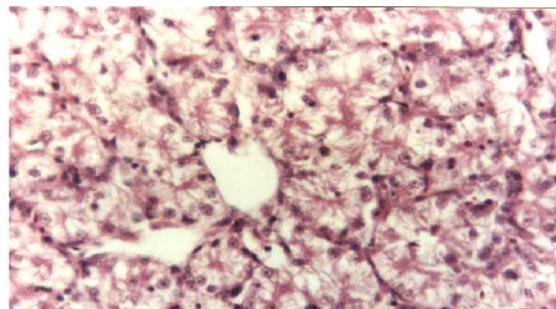


Fig.2 Section of liver with mild fatty changes and infiltration of few heterophils in Group III (H&E x 500)

birds fed with standard basal ration as per NRC (1994), group II birds were fed with standard feed mixed with 1 ppm aflatoxin B<sub>1</sub>, group III birds were fed with mycotoxicated feed containing 1 ppm aflatoxin B<sub>1</sub> medicated with Toxiroak (M/s Ayurved Ltd, Baddi, India) @ 0.125 per cent. Toxiroak is a herbomineral toxin binder product comprised of scientifically proven herbs viz. *Allium sativum*, *Azadirachta indica*, *Solanum nigrum*, *Emblca officinalis*, *Curcuma longa* and hydrated aluminosilicates (HSCAS). The experimental diet was fed to respective groups for six week and the end of 6th week representatives 40% birds per group were sacrificed by exsanguination for detailed necropsy examination and histopathological studies.

#### Results and Discussion

##### Gross Lesions:

No gross lesions were recorded in control (group I) birds. In aflatoxicated group II, pink discoloration of musculature along with petechial hemorrhagic spots, swelling congestion and atrophy of spleen was observed. Fatty liver with ecchymotic haemorrhages, splenomegaly and enlarged kidney. Aflatoxicated & treated Group III showed the milder degree of fatty degeneration and enlargement in liver and kidney with hemorrhagic spots on musculature as compared to mycotoxicated untreated birds (Group II). Similar gross and histopathological changes in vital organs were

recorded in birds induced with aflatoxicosis by Ortatati and Oguz, (2001) and Denli, et al. (2009).

##### Histopathological evidences:

Group I birds showed no histopathological alterations and normal anatomical architecture where as, group II aflatoxicated birds showed moderate to severe fatty changes, loss of architecture, mild to severe aggregation of lymphoid cell and heterophils in periportal and parnechymatous areas in addition to multifocal necrotic foci in liver (Fig.1). Severe fatty changes with considerable loss of architecture due to accumulation of large fat droplets in nucleus in addition to mild infiltration of lymphoid cells in the interstitial spaces of kidney were also evident in addition to vacuolar degeneration of renal tubular cells (Fig 4). Aflatoxicated and Toxiroak treated group III birds showed mild fatty changes, accumulation of lymphoid cells with few heterophils in liver and kidney (Fig.1 and 3). Vacuolar degeneration in renal tubule and liver showed mild fatty changes in few hepatic lobes in addition to mild biliary hyperplasia with necrotic foci indicating the adsorption of mycotoxin from feed (Fig.2 and 4). Gross and histopathological findings observed during mycotoxicosis in the present study are in agreement with those of Balachandran and Ramakrishna, (1987) and Zahid hussain et al., (2008) during aflatoxicosis.

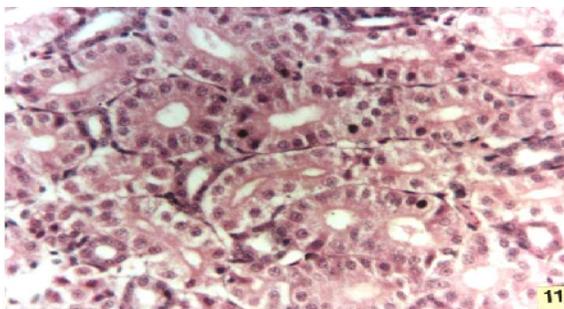


Fig.3 Section of kidney showing little lymphoid cell infiltration in interstitial space with mild fatty changes in Group II (H&E x 500)

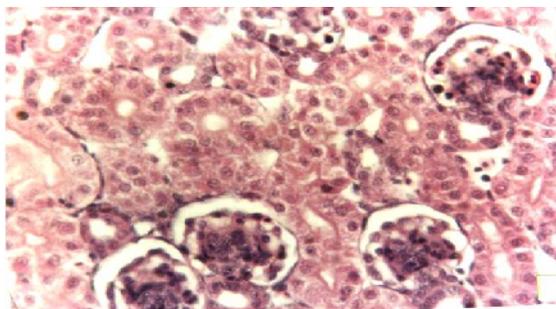


Fig.4 Section of kidney showing little lymphoid cell infiltration in interstitial space with mild fatty changes in Group III (H&E x 500)

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