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Cases of acute aflatoxicosis in Campbell ducks: A pathomorphological study

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Abstract

Campbell duck farmers reported mass mortality in their farms. Within a span of about one weeks, the number of deaths were sharply increased despite being treated. To ascertain the cause of death, blood was collected from the ailing birds and a detail post mortem examination was conducted. The different lesions were recorded, impression smear for cytological study and representative samples for histopathology was collected from different organs. Gastric ingesta was also collected to rule out possibility of mycotoxicosis. History of the case, blood report, gross and microscopic examination, response to treatment all confirmed it as a case of acute Aflatoxicosis.

Keywords: Campbell ducks, Aflatoxicosis, cell damage, haemorrhage, microscopy

Introduction

Aflatoxicosis are a matter of great concern for the poultry industry. Due to consistent high humidity the fungus gets opportunity to grow in the feed, causing high level of toxicities. Aflatoxins (AFs) B₁, B₂, G₁ and G₂ are mycotoxins that may be produced by 3 fungi of the *Aspergillus* species, *A. flavus*, *A. parasiticus* and *A. nomius*. Among these aflatoxin B₁ (AFB₁) is the most prevalent and potent toxin. They are found in high concentrations in groundnuts, maize, cereals¹ (Cortes *et al.*, 2010)^[1]. Young ducklings are most susceptible to AFB₁ toxicity due to the higher level of liver microsomal enzymes which metabolize aflatoxins into metabolite 2-8 epoxide etc. which ultimately lead to toxicity. Aflatoxins thus, influence the metabolism of poultry and the main manifestations are tissue necrosis, hepatic cirrhosis and liver cancer (Abedi and Talebi, 2015)^[2]. Aflatoxin even affects the blood coagulation mechanism in birds due to the loss of one active component of tissue thromboplastin.

Materials and Methods

We received request from the duck farm owners to conduct post mortem and ascertain the cause of death. In the present case, two almost similar cases of sudden and high mortality in Campbell ducks was reported in two different farms near to Patna district of Bihar in the month of August. In the first case, 1600 ducks of 3 months of age collapsed in a week duration. These ducks during three month of rearing were quite normal and healthy. But with the change of feed, all of a sudden there was reduced appetite and mortality in ducks. The ailing ducks were showing incoordination, greenish diarrhoea and blood was oozing from mouth of some ducks. In second case 500 ducks aged about 5 months collapsed in just three days with similar symptoms. They have also brought some ailing ducks showing advanced symptoms of incoordination while few ducks were comatose.

A detailed post mortem examination was conducted and impression smear was made from affected organs. Representative tissue samples from the affected organs were collected in 10% neutral buffer formalin for further histopathological examination. Blood was collected from the ailing birds in EDTA vial for complete haematology. Gastric ingesta was also collected to rule out possibility of mycotoxicosis.

Results and Discussion

External examination showed fair body condition with dried blood crust near oral cavity in some ducks. The sub cutis area particularly in the neck, pectoral and thigh region was cyanosed and filled with massive blood clots. The hematoma were of such intensity that it appears as of some traumatic injury. Upon opening of the body massive blood clots were observed in the abdominal cavity (Fig. 1 A). There was variable degree of yellowish discoloration with pin point

haemorrhages in the sub capsular region in the liver of affected ducks (fig. 1B). Kidneys were slightly enlarged and showed nephrotic changes with congestion (fig. 1C). Lungs in some ducks were congested and oedematous. Pin point haemorrhages were also noticed in the heart epicardium. There was blood tinged catarrhal exudates in the intestinal lumen. Other organs like thymus, bursa and spleen was also congested.



Fig 1: Gross picture of post mortem of ducks showing A. - bleeding in the thigh muscles and abdominal cavity. B. - yellowish discoloration of liver with multifocal petechial haemorrhages. C. - congestion with nephrosis in kidneys.

Haematology report showed decrease in the number of platelets with mild increase in heterophils and total leucocyte count, which was in agreement with the findings of Sujatha *et al.* 2021 [3]. Microscopic examination of the impression smear revealed presence of some epithelial cells admixed with RBC's, heterophils and mononuclear cells. Microscopic examination of the liver section of different ducks showed changes of fatty degeneration as evidenced by vacuolar degeneration of hepatocytes. Focal areas of hepatocytes necrosis, infiltration of mononuclear cells, mild sinusoidal congestion, some cases showed bile duct hyperplasia and fibrosis around the bile duct (fig. 2A). Microscopic

examination of Kidneys of different ducks revealed interstitial congestion along with oedema and haemorrhages, hyaline proteinaceous material in the tubular lumen and cellular swelling of the renal tubular epithelium occluding the lumen of the tubules (fig. 2B). Lungs in most of the cases showed congestion with focal infiltration of inflammatory cells of the para bronchi (fig. 2C). Interfollicular edema and depletion of lymphocytes in the bursal follicles were also seen (Kumar and Balachandran, 1998; Perozo and Rivera, 2003) [4, 5]. Desquamation of intestinal lining epithelial cells and presence of desquamated cellular debris were the changes noticed in most of the intestinal sections.

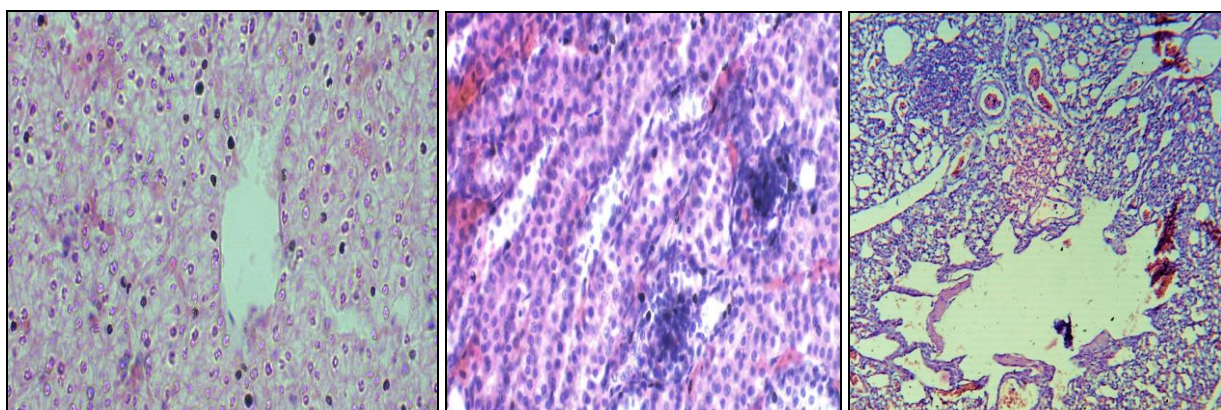


Fig 2: Photomicrograph of tissue section showing A.- Vacuolar degeneration, hepatocyte necrosis and infiltration in liver (H&E-10x). B- showing congestion, cellular swelling of renal tubular epithelial cells and infiltration in kidney (H&E-10x). C. - lung section showing congestion and infiltration in the para bronchi (H&E-10x).

On the basis of history of change of feed and feeding of corn, haematology, gross lesions and histopathological changes the case was suggestive of Aflatoxicosis. Upon ingestion, AFB1 is absorbed in the duodenum and reaches the liver where it is bio activated by the action of various microsomal cytochrome enzymes (CYP450). These are monooxygenases that catalyse the oxidation of the C⁸ = C⁹ double bond in the furan ring

yielding AFB1-exo and-endo 8, 9 epoxide stereoisomers, with the former isomer being >1000 times more reactive/toxic than the latter (Iyer *et al.* 1994) [6].

Dietary additives such as activated charcoal, phenobarbital, cysteine, glutathione, beta-carotene and Fisetin have been reported to be effective in the reduction of aflatoxicosis in poultry. In the present case recommendation of immediate

change of feed, and supplementation of Vit. E and Selenium provided fast result and the mortality immediately reduced to zero. Change of affected feed is necessary as the fungus might have grown due to consistent high humidity in the month of August here in Bihar, particularly. Once diagnosed the case can be successfully treated with change of feed and minimum cost treatment. Therefore, early diagnosis and awareness is important in case of Aflatoxicosis to avoid economic losses and sufferings.

Conflict of Interest: Authors have no conflict of interest in this study.

Author's contribution: Carried out blood collection, post-mortem examination and laboratory procedures and preparation of post mortem report, analysis of data, draft and revision of manuscript.

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