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Epidemio-pathological studies of gout in broiler birds in West Bengal

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ABSTRACT

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A total of 33,713 broiler birds were examined during 2004 and 2005 in West Bengal to study the incidence andpathology of gout. Overall, 7.03% incidence of gout was recorded. Clinically, the affected birds showed dullness unthriftiness, reduced feed intake, loss of body weight, diarrhoea and death. Grossly, gouty birds revealed chalky white urate deposition in the subcutaneous as well as in the visceral organs tissues. Microscopically, kidneys exhibited excessive deposition of urate crystals in the glomeruli and tubules. Liver had congestion and haemorrhages with occasional urate deposition. Heart and lungs revealed vascular changes along with urate deposition and cellular infiltration. Spleen had congestion, haemorrhages and depletion of lymphoidal cells. Intestine showed necrosis of mucosa with exfoliation in the lumen. The synovial membrane of the joint was swollen, hyperemic with inflammatory cell infiltration. Urate crystals in the periarticular tissues were found. Kidney sections stained with DeGalantha's method revealed black, needle shaped urate crystals arranged in a radiating manner.

Keywords: Broiler birds, histochemical changes, gout, pathomorphology.

Gout is a common metabolic disorder characterized by high level of uric acid in the blood causing deposition of urates on the surfaces of various internal organs and joints and is responsible for a great deal of morbidity and mortality in both broilers and layers leading to a great economic loss to poultry farmers. Two forms of gout viz. visceral and articular forms were recorded either alone or together. Both forms were recorded in 40% cases of gout[10].Though there are sufficient reports of incidence of gout in broiler birds throughout the different states of India, but there is paucity of reports of pathomorphological changes in gout of broiler birds in West Bengal. Hence, the present study was conducted to report the incidence, pathomorphological and histochemical changes of gout in broiler birds.

Broiler birds affected with gout were screened in 15 different private and commercial broiler flocks located in new "Alluvial" zone (North 24 Paragana, Hooghly, Howrah, Burdwan, part of Midnapur) of West Bengal for one year starting from July, 2004 to June, 2005. For the study of gross pathological lesions, detailed examination of all the dead birds affected with gout were performed meticulously soon after death. Gross lesions were recorded. Necessary representative pieces from grossly involved visceral organs and joints collected at necropsy were fixed in 10% neutral buffered formalin. All the tissues were processed for paraffin sectioning (3-5μm) and stained with Harris Haematoxylin and Eosin for histopathological examination[1]. Histochemical studies were done by Periodic Acid Schiff (PAS) reaction and DeGalantha's method for urate crystal. PAS reaction was done with the aid of normal hydrochloric acid solution, 0.5% periodic acid solution, 10% sodium metabisulfite and Schiff reagent. For staining of urate crystals, absolute alcohol fixed tissues were processed and sections were stained with the help of 3% gelatine, 20% silver nitrate and 2% hydroquinine solution[5].

Incidence: Out of total of 33,713 broiler birds examined, 2371 were clinically found to be naturally affected with gout, the overall incidence of the gout being 7.03% which corroborated with the findings of earlier workers[10] who also reported the incidence of gout in broiler birds ranging from 6.25% to 12.86% in Gujarat.

Gross lesions: Rapid screening examination of all the birds disclosed dehydrated carcasses. Chalky white deposits were seen over the subcutaneous tissues, kidneys, pericardium, lungs, liver, spleen and serosal surfaces of the gastrointestinal tract and in air sacs. The pericardium was thickened and had a plaster like appearance. The kidneys were enlarged with urates deposition in ureters, harder in consistency. Liver was enlarged, friable and congested. Lungs were edematous, congested. These gross lesions recorded in the present study confirmed the earlier reports[2,6,7].

In some cases, along with surface of visceral organs, articular surface particularly hock joints revealed chalky white urate deposition. The joints were enlarged and swollen. When the joints were opened, the periarticular tissues were white due to urate deposition and white

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semifluid deposits of urates were found within the joints. So, visceral and articular gout occurred concurrently in some cases, which simulated the earlier reports[2,3,6,8]. Urate deposition was generally due to failure of urinary excretion. This might be due to obstruction of ureters, renal damage or dehydration.

Histopathological lesions: Histopathologically, kidney sections showed extensive changes both in glomeruli and tubules with abundant deposition of urate crystals in the form of spongy balls of variable size (Fig.1). In conjunction with the cluster of sharp acicular crystals, there were infiltrations of inflammatory cells. Atrophy of glomeruli in a few areas and hypertrophy of glomerular tuft were also seen. Some of the glomeruli and tubules were found necrosed and a portion of the tubules were found dilated. In them, stray hyaline casts were seen at few places of the dilated tubules. Swelling of the cells of visceral layer of Bowman's capsule was observed frequently. There was also evidence of moderate haemorrhages in some areas. The earlier workers[6,11] also observed the same changes in the kidney in gout. Liver revealed congestion and haemorrhages. Depositions of urate crystals were found occasionally. Marked infiltration of heterophils and mononuclear cells were observed at different zones of liver. The capsule of the liver at different zones showed marked thickening due to proliferating fibrous tissues[4,6,8]. Heart showed congestion, haemorrhages, edema, deposition of urates of varying degree along with infiltration of mononuclear cells and heterophils. Pulmonary lesions were mainly confined to the epithelium of the primary bronchus. Patchy desquamation of epithelium was observed and scanty purulent exudate was present in lumen of bronchi and bronchioles. Congestion, haemorrhage, edema, deposition of urates along with infiltration of heterophils were also noted. The histopathological observation of heart and lung sections corroborated the earlier reports[4,8]. Trachea revealed diffuse infiltration of polymorph nuclear leucocytes in the epithelium and in the deep layer of mucosa. Pronounced desquamation of the epithelium throughout the length of trachea was found. The mucosa presented a serrated appearance. These lesions were identical to earlier workers[7] who observed these lesions in a detailed study of the histopathology of infectious bronchitis in fowls. So, in the present study, infectious bronchitis virus might be the causation factor in those gouty birds showing such tracheal lesions. Spleen had congestion, haemorrhage and depletion of lymphoidal cells. Moderate degree of urate deposition was observed. Proventriculus showed congestion, oedema, petechial haemorrhages and infiltration of inflammatory cells in the serosal surface along with uric acid deposition of varying intensity. The similar lesions were reported in the spleen and proventriculus by other workers[11]. Lesions in the intestines comprised of necrosis of mucosa with exfoliation in the lumen and thickened mucosa with mononuclear cell infiltration. No urate crystals were found. Earlier workers partially supported the present findings[11]. Presumably, urates often dissolved during tissue processing which may have prevented them from identified in some tissue sections, examined microscopically. The synovial membranes of capsule were swollen, hyperemic and showed areas of inflammatory cells infiltration. Urate crystals deposition in periarticular tissues was found. Similar findings were also reported by different workers[8]. It was therefore concluded that in some cases, visceral and articular gout occurred concurrently, which simulated the earlier reports[6,8,9].

Histochemical findings: Sections of the kidneys revealed PAS positive, magenta coloured hyaline casts in dilated tubules. PAS positive granules were frequently

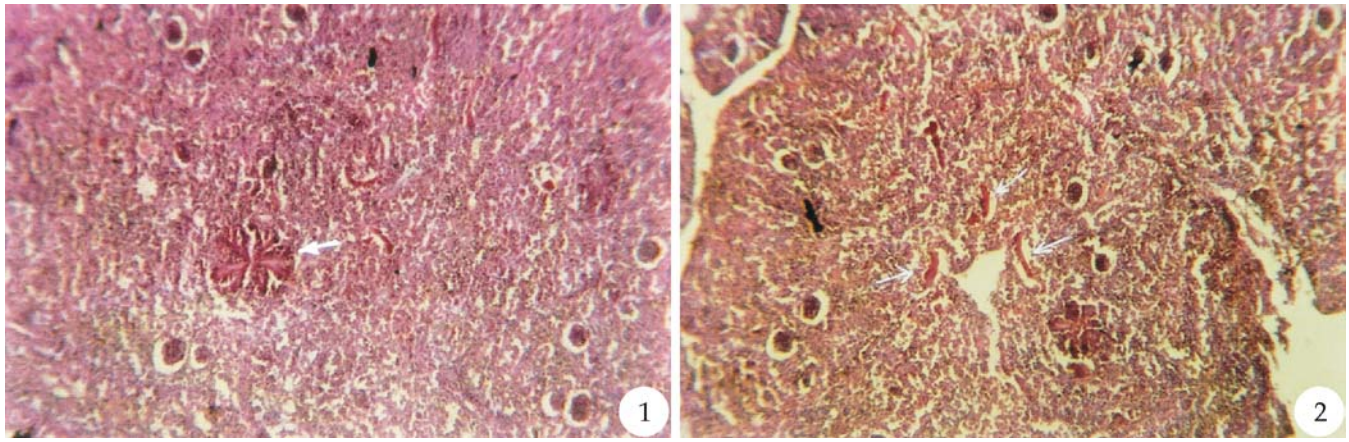

Fig. 1. Section of kidney showing urate crystals in the form of spongy balls of variable size (HE x100). **Fig. 2.** Section of kidney showing deposition of needle shaped urate crystals in radiating manner (DeGalantha x100).

seen in the tubular epithelial cells, free in the lamina of the tubules or distributed between the cellular exudates in the tubular lumina. The present observation simulated with the findings of earlier workers who studied the pathology of infectious bronchitis in fowls. The section of kidney stained with DeGalantha's method revealed black, needle shaped urate crystals arranged in a radiating manner (Fig.2). The present findings confirmed the reports of earlier workers.

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