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Studies on the Gross Pathomorphological Changes and Mortality Pattern in Broiler Chicks Affected with Different Diseases in Different Farms of Eastern Uttar Pradesh

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Abstract

The naturally dead broiler chicks from 10 different private farms in Faizabad and Sultanpur districts of Eastern Uttar Pradesh, India was collected for one year (May, 2017 to April, 2018) to record the mortality rate of chicks at the brooding stage in different disease conditions and to identify the causal agents involved in chick mortality along with the gross pathological changes. Salmonellosis, Colibacillosis, Aspergillosis, Mycoplasma Colibacillosis Complex and the gout were the diseases diagnosed on the basis of history, clinical signs, gross pathological lesions in the dead birds. The highest broiler chick proportionate mortality in the present investigation was recorded 68.13% due to Aspergillosis. This was followed by Colibacillosis (61.33%), Mycoplasma-colibacillosis complex (60.00%), Salmonellosis (56.83%), Gout (48.97%) and Yolk sac infection (46.67%).

Keywords: Broilers Chick, Causal Agents, Mortality, Pathology

Introduction

Poultry farming in reality is an important tool for providing self-employment, supplementary income and eradication of rural poverty and to combat malnutrition by providing cheap source of animal protein with high biological value. Scientific breeding, feeding, management and disease control are the key point of success in poultry production. One of the major constraints in the growth of poultry industry is the outbreaks of diseases, which cause up to about 30% mortality every year (Ali, 1994). Among the poultry industry, the broiler segment heads the industry, in order to meet the growing demand for meet in our country. Farmers get a continuous income by eggs and meat throughout the year. Beside all, this industry generates millions employment and opportunities, and provide enormous potential to bring about rapid economic growth, benefitting the society (Ali, 1994).

The intensification in poultry industry has led to increased susceptibility to various disease conditions in the birds (Kumar *et al.*, 2019). The economic losses may be due to lack of knowledge of epidemiology, diagnosis and control of avian diseases. The diseases have a catastrophic potential for spread on a large scale. In addition, avian colibacillosis is one of the most common infectious diseases seen in poultry of all age group and usually found in young chick of up-to three weeks of age (Parwez *et al.*, 2015). This disease is very important as it causes heavy mortality causing heavy economic loss. Further, it suppresses immune system of the chicks making them more susceptible to get infections easily. Although knowledge about the epidemiology, pathogenesis and pathology of a particular disease is a pre-requisite for proper diagnosis as well as for the prevention and control of the diseases. To sustain the loss and achieve successful broiler production, a detailed survey is needed to be done regarding mortality rate, causal agent involved, specific pathological changes so that managemental practices can be improved and more income can be generated by the poultry farmers. Keeping these facts in view, the present study was undertaken.

Materials and Methods

The naturally dead broiler chicks from 10 different private farms in Faizabad and Sultanpur districts of Eastern Uttar Pradesh were collected for one year (May, 2017 to April, 2018) for the present study. The specimens (liver, lung, spleen, kidney and intestine) were observed for gross lesions. Samples were also collected from the ailing birds of the concerned farms. The infections such as yolk sac infection, Mycoplasma Colibacillosis complex or gout, were diagnosed on the basis of gross lesions.

Results and Discussion

Pathological Study

The present pathological investigation identified a number of maladies responsible for morbidity and mortality of broilers. Overall prevalence of diseases of broilers with their age susceptibility and case fatality rate is shown in Table 1.

Table 1: Overall prevalence of diseases of broilers with their age susceptibility and case fatality rate

Diseases	Age (days)	Total No. of Affected Chicks	Total No. of Death	Case Fatality (%)
Colibacillosis	8-19	556	341	61.33
Yolk sac infection	2-5	75	35	46.67
Salmonellosis	7-14	139	79	56.83
Gout	5-14	98	48	48.97
Aspergillosis	5-14	204	139	68.13
Mycoplasma colibacillosis Complex	9-17	70	42	60
Total		1142	684	

Colibacillosis

In the present study, colibacillosis was recorded in the seven farms out of the total ten farms. Among 556 affected birds, 341(61.33%) were died. The age group of affected birds were 8-19 days. The morbidity rate varied from 2.57-

4.83% whereas mortality rate varied from 1.32-2.6%. The affected birds showed loss of appetite, depression, dyspnoea and diarrhoea. Sometimes paste like faeces soiled the vent feathers. The post mortem examination was conducted for the dead birds in all the affected farms. The gross changes of liver found were enlarged, congested and covered with thick yellow/white serofibrinous covering (Figure 1). The serofibrinous membrane covered the liver either partially or completely that differs with degree and severity of infection. In intestine hemorrhages, congestion and edematous swelling were noted. Heart was also covered with thick yellow/white serofibrinous covering. In birds with severe infection, the serofibrinous membrane covered all the visceral organs. The gross lesions observed in the present study corroborated with the earlier findings of Edwards *et al.* (1972), Rahman *et al.* (2003) and Tonu *et al.* (2013).

Yolk Sac Infection

During first week of age 35out of 75 (46.67%) affected chicks were died due to omphalitis or yolk sac infection in two farms. Broiler chicks up to one to two weeks of age were affected. The affected birds showed depression and huddling around the source of heat. Necropsy examination revealed considerably thickened unabsorbed and oedematous yolk (Figure 2) in all the dead chicks. The content of the sac was cloudy and malodorous. There were congested blood vessels around the yolk. The liver in few chicks were markedly pale.

Figure 1: Thick milky fibrinous covering on the surface of liver and heart of chick due to *E. coli* infection

Figure 2: Unabsorbed and oedematous egg yolk in the broiler chick died due to yolk sac infection

Salmonellosis

This investigation recorded a total of 139 cases of salmonellosis in two farms. The morbidity rate varied from 2.92 to 3.11% and mortality 1.38 to 1.92%. The affected and dead birds were between 7 to 14 days of age. The affected birds had a tendency to huddle near the source of light. The birds were dull and depressed. The affected birds showed inappetence, fever and diarrhoea. The liver was enlarged and congested and, in few cases, it showed punctiform haemorrhages and focal necrosis (Figure 3). Petechial haemorrhages were seen in spleen, base of the heart and kidney. Lungs were pneumonic in some cases. There was hyperemia and catarrhal inflammation in the intestine.

Gout

This investigation recorded a total of 98 cases of gout of which 48 died in two farms. The morbidity rate ranged from 2.28 to 3.4% and mortality rate varied from 1.03 to 1.9%. The affected birds were between 5 to 14 days of age. In the present study, it was observed that the onset of the disease was sudden. Clinically, the spontaneously affected gouty birds showed no specific clinical signs (Chowdary, 1998). The chicks showed dull appearance, reduced feed intake resulting in uneven sizes, gradual emaciation, loss of body weight, polyurea diarrhoea with sudden death. Previous workers (Altman *et al.*, 1997 and Jana *et al.*, 2008) also described the similar clinical signs. Rapid screening of all the dead birds disclosed dehydrated carcasses. Chalky white deposits were seen over the subcutaneous tissues, liver, kidney, heart, lungs, spleen, surface of the breast muscle and serosal surface of the gastrointestinal tract and in air sacs (Figure 4). The pericardium was thickened and had a plaster like appearance. The kidneys were enlarged and harder in consistency with urate deposition in ureters. The liver was enlarged, friable and congested. Lungs were oedematous and congested. These gross lesions recorded in the present study, confirmed

the earlier report (Eldaghayes *et al.*, 2010). In some cases, along with surface of visceral organs, articular surface particularly hock joints, revealed white chalky urate deposition. The joints were enlarged and swollen. When the joints were opened, the periarticular tissues were white due to urate deposition and white semifluid deposits of urates were found within the joints. So, visceral and articular gout occurred concurrently in some cases which simulated the earlier reports of Calnek *et al.* (1994) and Jana *et al.* (2008). Urate deposition was generally due to failure of urinary excretion. This might be due to obstruction of ureters, renal damage or dehydration.

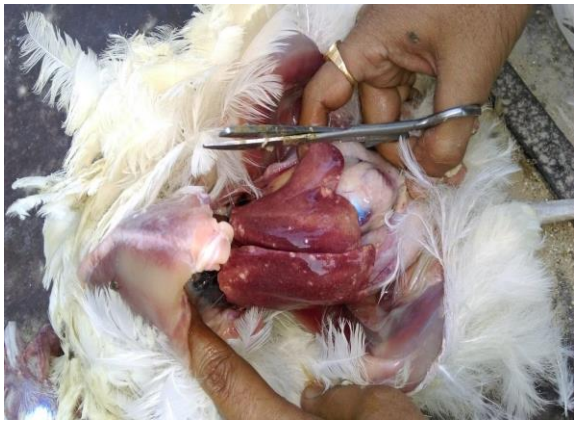

Figure 3: Enlarged and congested liver with focal areas of necrosis in the bird died due to Salmonellosis

Figure 4: Chalky white uric acid deposition in heart in gout affected chick

Aspergillosis

Aspergillosis was diagnosed in 204 chicks of 5 to 14 days of age. The morbidity varied from 2.05 to 3.26% and mortality varied from 1.5 to 2.18%. Among them 139 birds were died. The affected birds showed dyspnoea, depression and emaciation with loss of appetite and increased thirst. Most of the birds found severely emaciated and cachectic. Yellowish and / or whitish nodules of different sizes and shapes were found mainly in the lung, air sac, pleura and peritoneum. Presence of mucus in trachea and bronchial mucus plugs were seen. Multifocal granulomatous/nodular (small) pneumonic lesions were found in the lungs (Figure 5).

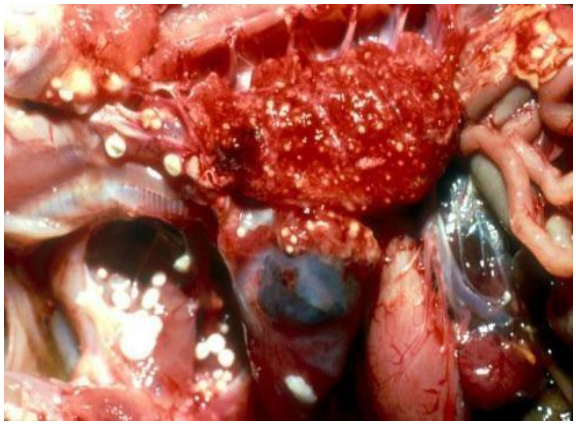

Figure 5: Multifocal granulomatous lesions in the lungs of Aspergillosis affected birds

Figure 6: Thickening of the air sac and fibrinous perihepatitis with extensive deposition of fibrin in visceral organs of the birds died due to mycoplasma colibacillosis complex

Mycoplasma colibacillosis Complex

Among the infected 70 chicks (9-17 days old) 42 died due to this malady with morbidity rate 2.5% and mortality rate 1.5%. The affected birds had sneezing, coughing, respiratory distress with loss of appetite and diarrhoea. Presence of catarrhal exudates in nasal passage and trachea, petechial haemorrhage on spleen and base of the heart were observed. Thickening of the air sac, fibrinous peri-hepatitis and pericarditis with extensive deposition of fibrin

on the surface of visceral organs (Figure 6) were observed that formed the basis of diagnosis in this study.

Conclusion

This paper discusses the gross morphological changes as observed in the field conditions. Salmonellosis, Colibacillosis, Aspergillosis, Mycoplasma Colibacillosis Complex and gout were the major diseases recorded in both the districts of Eastern Uttar Pradesh. The morbidity and mortality rate varied from farm to farm depending upon the managemental practices and other superimposed infections. Establishing such field data can be helpful in early diagnosis and providing prompt treatment. Its correlation with immunohistochemistry and other biotechnological tools is however advocated for confirming the diagnosis.

Conflict of Interests

There is no conflict of interest.

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