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Original Research Article

Clinical Signs and Gross Lesion of Infectious Bronchitis Virus Associated with E. coli in Broiler Farm at Kirkuk City, Iraq

Abbas Najm Aldin Saleh[1]*

[1]Department of Pathology and Poultry Disease, College of Veterinary Medicine, University of Kirkuk, Kirkuk, Iraq

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Abstract: Infectious bronchitis virus is one of the most important economic viral diseases of poultry that is spreading worldwide, affects both gallinaceous and non-gallinaceous birds. Avian Pathogenic *Escherichia coli* (APEC), classified under the extra-intestinal pathogenic E. coli (ExPEC) category which causes various syndromes in poultry including systemic and localized infections. Infectious bronchitis and E. coli diseases caused by pathogens are considered infectious or contagious because they can be transmitted from poultry to poultry through direct and indirect routes. According to their pathogenic microorganism, they can be biologically classified into viruses, bacteria, fungi, parasites and protozoa. There was total of "Ross strain" chicks used in this study was 21000, (1.523) chickens died resulting in an overall mortality rate of (7.5%) chicken. There were changes in clinical symptoms that occur in broiler chickens aged 10-15 days. These changes include respiratory signs such as difficulty breathing, cough, depression, and decreased appetite. There were changes in post mortem that occur in broiler chickens aged 12, 16 and 31 days. Those changes include mild congestion in the trachea at (12 day of age), congestion in the lung at (16 days of age), nodules and thick surface in the proventriculus and mild congestion in the ileocecal junction at (31 days of age), the lesions that appear were suspected of the infectious bronchitis disease. The study was conducted to determine the prevalence and incidence of an Infectious bronchitis and E. coli pathogens of significant economic importance in broiler farm at Kirkuk City, Iraq. At the end, the results obtained from this work also confirm the suitability of postmortem changes in infectious bronchitis virus and E. coli bacteria included mild congestion in the trachea and proventiculus, also fibrinous peri-hepatitis and pericarditis in broiler chicks.

Keywords: Broiler, Poultry, Micro-organism, Pathogens, Infection.

INTRODUCTION

Infectious bronchitis virus (IBV) is one of the most significant economic viral diseases of poultry that is spreading worldwide (Colvero *et al*., 2015; Khataby *et al*., 2016). This disease causes economic impact includes reduced egg production and poor egg quality in laying hens, and stunted growth, poor carcass weight, and mortality in broilers (Bande *et al*., 2016; AlMoula *et al*., 2020).

Avian Pathogenic *Escherichia coli* (APEC), classified under the extra-intestinal pathogenic E. coli (ExPEC) category (Mellata, 2013), which causes various syndromes in poultry including localized and systemic infections (Ramatla *et al*., 2023). That leads to high mortality and morbidity rates.

In many countries, broiler production has become one of the most advanced animal food production sectors (Chang 2007). In Iraq, the poultry industry has become increasing importance as most poultry farms are small and spread across most of the country's governorates, providing job opportunities for tens of thousands of unemployed people (Natali, 2010). The intensification of work in the poultry industry has increased the susceptibility of birds to various disease conditions (Kumar *et al*., 2019).

Infections caused by pathogens are contagious because they can be transmitted from poultry to poultry through direct and indirect routes. According to Agunos *et al*., (2016) their pathogenic microorganism, biological nature can be classified into viruses, bacteria, fungi, parasites and protozoa. The performance of fast-growing broilers and laying hens is affected by disease because it reduces feed intake, growth rate, weight gain, survival rate, and egg production because of poor digestion, absorption, and nutrition (Julian, 2005). These diseases

***Corresponding Author:** Abbas Najm Aldin Saleh
Department of Pathology and Poultry disease, College of Veterinary Medicine, University of Kirkuk, Kirkuk, Iraq

infectious bronchitis and E. coli increase mortality from respiratory infections (tracheal plaques), enteritis (intestinal inflammation), bloody diarrhea, paralysis, and neck and head prostrations, as well as immune response suppression (Saleh, 2024). Variable mortality rates have been reported from different locations (Awobajo *et al*., 2007). Furthermore, the expenses associated with treating and managing flocks during the disease period progression increase the severity of the losses (Corkery *et al*., 2013).

Prevention disease and control requires a careful assessment of the entire farm and the establishment of a series of biosecurity measures that allow the assessment of potential challenges and their impact on the production system (Collett, 2013). Biosecurity measures include environmental control and management measures, including vaccination programs, medication and the use of effective detergents, disinfectants and sterilizer (Abass, 2015; Maletić *et al*., 2023). These biosecurity measures are important to controlling diseases and decrease their economic impact and public health importance (Abdelaty *et al*., 2019; Gelaude *et al*., 2014). The study was conducted to determine the prevalence and incidence of a group of viral and bacterial pathogens of significant economic importance in commercial broiler poultry in Kirkuk.

MATERIALS AND METHODS

Study Area

The study was conducted in Kirkuk city, Iraq. The study groups were broiler chickens for all ages; they were raised under intensive production systems.

Study Design

Twenty-one thousand newly hatched commercial broiler "Ross" chick's farms located in the Kirkuk city raised between December 2023 to the May 2024. The chicks have grown according to standard management technique. The basic scientific diet for broiler chicks was supply. All nutrient including water were provided *ad libitum* to meet the requirement of the National Research council (1994). The birds were vaccinated against Infectious bronchitis disease by spray at one day of age, the 2nd vaccination done with inactivated Avian Influenza vaccine by injection at 4 days. At the end, the 3rd and 4th vaccinations were done with live NDV vaccine by spray at days 16 and 24 of age.

Clinical Manifestation

The live birds were closely monitored for disease history, sings of infection, and sick chickens clinically examined weekly during the study period, exam criteria included overall look, feathering, weight, skin and apparent mucous membrane coloration, physical injuries, face tissues, eyes, feces (droplets), respiratory secretinos from the nose or airways, breathing, walking, leg abnormalities (joints), and external parasites. The incidence rate was determined by recording any morbidity or mortality (Hailegebreal *et al*., 2022)

Postmortem Examination

A detailed anatomical examination was performed on randomly selected clinically ill and critically ill birds based on established standard procedures (Bsrat *et al*., 2014). This study was conducted in Veterinary Pathology Laboratory, Collage of Veterinary Medicine at the University of Kirkuk. From the eyes through the mouth and nostrils to the cloaca, every organ was checked for lesions, hemorrhages, exudate, and any other abnormality.

Ethical Approvals

The animal experimentation was approved by the Ethical Clearance Committee of the College of Veterinary Medicine, Kirkuk University, under registration number Ki. Vet. 3 (2025). The present study was conducted from November 2023 to April 2024 in Kirkuk city, Iraq.

RESULTS

Clinical Symptoms Changes in Broiler Chickens

Changes in clinical symptoms have been observed in broilers chicken at 10-15 days of age. These changes include respiratory signs such as difficulty breathing (dyspnea), cough, depression, and decreased appetite (Fig. 1).

Figure 1: Respiratory signs of broiler chicks at second week age include difficult respiration, dyspnea and closed eye

The Incidence Rate of Mortality

During the study period, 1.523 chickens died resulting in an overall mortality rate of (7.44%) chicken. Table -1- shows that the mortality rate from the first week to the sixth weeks, noticed significant increased mortality in the first week it is likely to the stress hatching and transporting.

Table 1: The mortality rate of broilers chickens at ages from 1 to 6 weeks

Age (weeks)	Population (chicken)	Chickens death/weeks	Chicken death/day	Mortality (%/week)	Mortality (%/day)
1st	21.000	468	67	2.22	0.31
2nd	20.532	169	24	0.82	0.11
3rd	20.363	126	18	0.61	0.08
4th	20.237	339	48	1.67	0.23
5th	19.898	226	32	1.13	0.16
6th	19.672	195	28	0.99	0.14
Average	1.328	1.523	217	7.44	1.03

Post Mortem Changes

Postmortem inspection covers the examination of the carcasses of an animal's body after its death in Table 2. Postmortem changes were observed in broiler chickens at 12, 16 and 31 days of age. Those changes include mild congestion in the trachea (Fig. 2-A) at 12 days of age, and lung congestion (Fig. 2-B) at16 days of age. These lesions that appear to be suspected of the infectious bronchitis disease. Nodules and thick surface in the proventiculus (Fig. 3-A), and mild congestion in the ileocecal junction (Fig. 3-B) at 31 days of age. Based on the (Fig. 4-A and B) that was occurring fibrinous peri-hepatitis and fibrinous pericarditis at (16 and 31 days of age).

Table 2: Abnormality of changes in anatomical pathology in broiler organ aged 17-33 days

Organ	Changes in anatomical pathology
Trachea	Mild congestion
Lung	Congestion
Proventiculus	Nodules and thick surface
Liver	Fibrinous peri-hepatitis
Heart	Fibrinous pericarditis

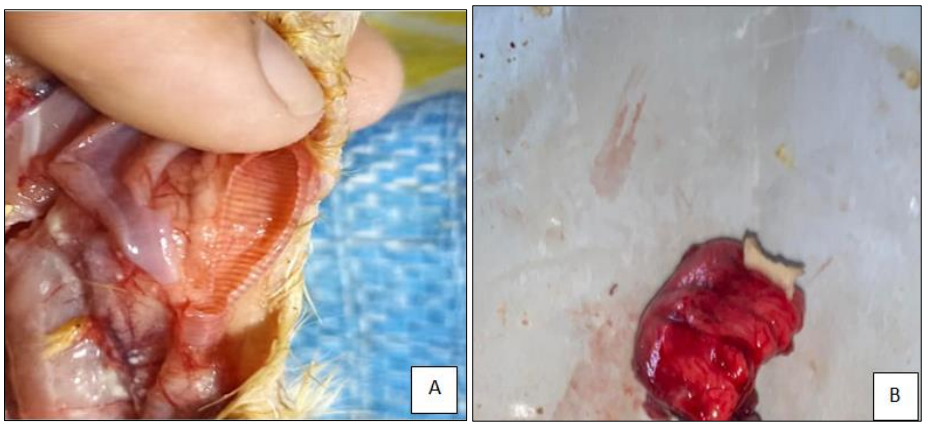

Figure 2: Show mild congestion in the trachea (A) 12 days of age, and in the lung (B) at 16 days of age.

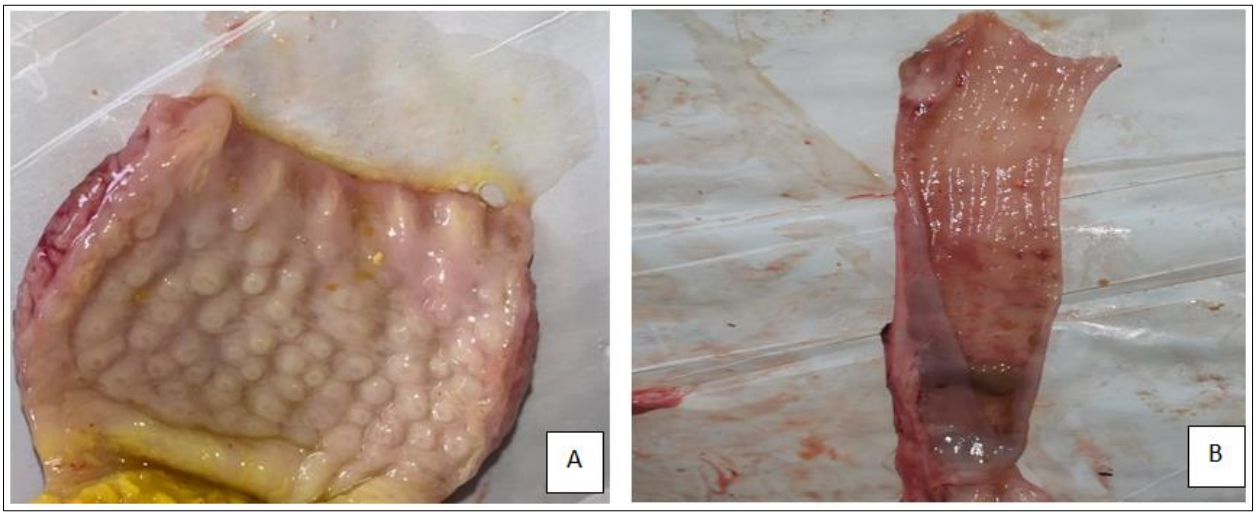

Figure 3: Show nodules and thick surface in the proventiculus (A) and mild congestion in the ileocecal junction (B) at 31 days of age

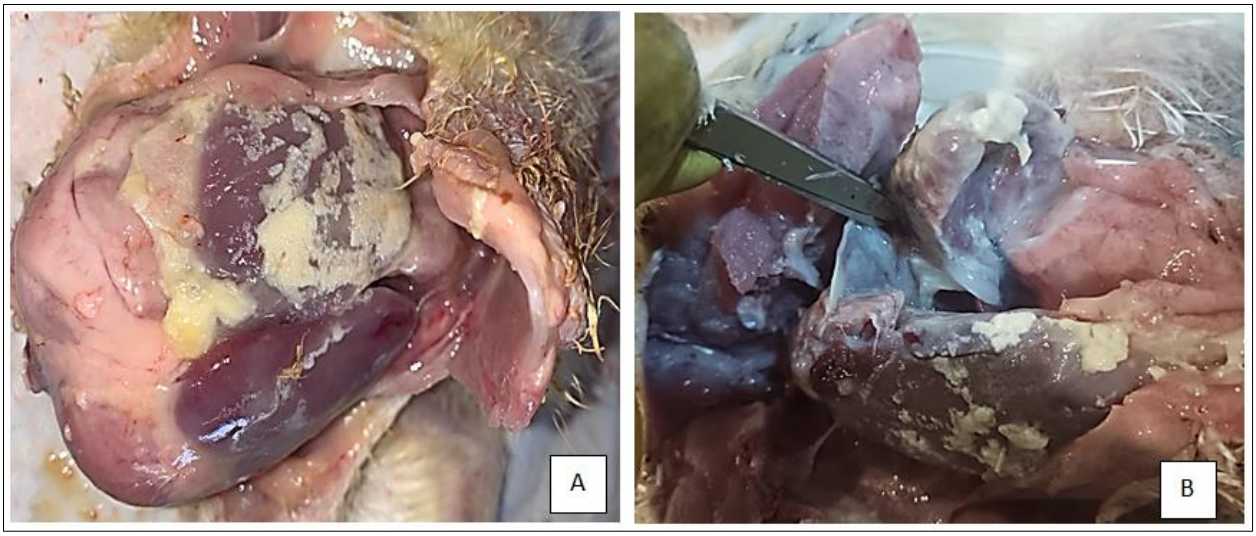

Figure 4: Show fibrinous peri-hepatitis in the liver (A) at (16 days of age), and (B) at (31 days of age)

DISCUSSION

Clinical Symptoms Changes in Broiler Chickens

The clinical signs that appeared were suspicious of the infectious bronchitis (IB). According to (Liu and Kong 2004; Liu *et al*., 2006) the clinical signs of IB are coughing, gasping, rales or sneezing with or without nasal discharge. In contrast, the present results differ from those of (Tegegne *et al*., 2020) which indicated that no clinical signs were detected in IBV positive cases.

The Incidence Rate of Mortality

In the fourth and fifth weeks, mortality rates increased, and higher mortality rates in these weeks indicate the presences of fibrinous peri-hepatitis showed in the post-mortem change in the death birds. This results were in agreement with (Kusnadi, 2006), the amount of mortality rate is affected by several factors, including body weight, ambient temperature, disease and environmental cleanliness.

Post Mortem Changes

The goal of postmortem examination in veterinary medicine is to provide an analysis of the abnormality at the level of the whole animal or even a herd (Corrigan, 1975). Analyzing dysfunction at the cell, organ, or system level alone is insufficient (Corrigan, 1975). This study is supported by (Schwartz and Bickford, 1986), who stated that in case of multiple deaths of chickens in the field, prompt and appropriate diagnosis is required. The results of a necropsy are shown in Table 2.

This research in (Fig. 2) agreement with (Mahmoud *et al*., 2019) investigated the study of the role of infectious bronchitis virus in the incident of respiratory and kidney diseases in broiler chicken farms in Egypt. In contrast, (Grgić *et al*., 2008) reported no significant lesion in the trachea and kidneys in experimentally infected chickens with infectious bronchitis virus.

These changes in (Fig. 3) are consistent with the findings of other researchers, who have suggested that IBV primarily affects the respiratory system, and show a wide range of tissues tropism, including the reproductive systems, renal and enteric form, which was in agreement with the results of (Bande *et al*., 2016). This research disagreement with (Benyeda *et al*., 2009, Chacón *et al*., 2014) the ability of IBV to cause proventriculitis have not yielded conclusive results.

These results in (Fig. 4) were consistent with those previously reported (Lateif *et al*., 2024), where the sub-clinical form of colibacillosis in chickens is characterized by fibrinous peri-hepatitis and fibrinous pericarditis. Nevertheless, infectious bronchitis virus may excess the susceptibility to other pathogens such as *E. coli* or H9 avian influenza virus (Belkasmi *et al*., 2020).

CONCLUSIONS

In conclusion, this is first work discusses the dramatic morphological changes as observed under field conditions. Infectious bronchitis and colibacillosis were the main diseases recorded in Kirkuk city. The morbidity and mortality rates varied depending on the management practices and other infections that emerged. However, a number of prevalent and significant illnesses that can harm a bird's respiratory, reproductive, gastrointestinal, and immunological systems and result in significant production losses pose a danger to the chicken business. Finally, the results obtained from this work also confirm the suitability of postmortem change included mild congestion in the trachea and proventiculus, also fibrinous peri-hepatitis and fibrinous pericarditis.

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Conflict of Interest: The author of this paper declare that they have no financial or personal relationships with any individuals or organizations.

Availability of Data and Materials: Data availability is available according to the request.

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