

Investigation of Pathological Effect of Infectious Bronchitis Virus in the Broiler's Trachea and Kidney in Basra-Iraq

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Abstract

Infectious bronchitis (IB) is an important economic, worldwide distributed, viral disease of poultry. It is caused by infectious bronchitis virus (IBV) that affects the respiratory, renal, and reproductive systems causing different pathological changes. One hundred broiler chickens of the District in Basra Government were suffering from respiratory problems. This study aimed to explore the gross and pathological changes of the IBV on the chicken trachea and kidney tissues. So that tracheal and kidney Samples were collected from these broilers for gross and microscopically study. The result shows necropsy lesion suggesting IB such as caseous exudates in tracheal bifurcation, and show tracheal histopathological changes represented by epithelial cells losses with the cilia, thinking of epithelial areas with infiltration of heterophils. also, the pathological findings of renal tissue revealed inflammatory changes, cellular degeneration lesions, and multiple corruption of the renal tubules.

Keywords: Infectious Bronchitis Virus, Trachea, histopathology, Kidney.

Introduction

Infectious bronchitis (IB) is an Avian viral disease, acute and highly contagious, and it mostly occurs worldwide (Mark W. Jackwood & Sjaak de Wit, 2020). IB is characterized by economic importance, especially in growing ages causing loss of

appetite, growth retardation, and high mortality (Bande *et al.*, 2017). IB is considered an airborne disease that spread directly and indirectly. poultry and most avian species are the virus natural host (Suryaman *et al.*, 2019).

Avian gamma coronavirus infectious bronchitis virus (IBV) is the etiological cause of IB disease which belongs to the subfamily Corona virinae and family Corona viridian (Mark W. Jackwood & Sjaak de Wit, 2020). IBV is a single-stranded, positive-sense, enveloped RNA virus consisting of around 27 Kb encoding four structural proteins which are nucleocapsid, membrane, envelope, and spike proteins abbreviated in (N), (M), (E), and (S) respectively (Dimitrov *et al.*, 2019). The IBV infection was valued, according to global economic impact, as the second most harmful disease of poultry next to the highly pathogenic influenza (de Wit & Cook, 2019).

The pathogenicity of the IBV began in the bird respiratory tract then the virus spread systemically infecting many tissues making damage to the epithelial cells (Jackwood, 2012) Besides the respiratory infections, IBV affects the reproductive tract and, the kidney causing low egg production and pad quality and renal damage respectively (Bande *et al.*, 2016). The severity of the IB depends on, the IBV strain, immune status of the bird, farm environment, and co-infections with immunosuppressive diseases (Mark W. Jackwood & Sjaak de Wit, 2020).

This study aimed to explore the gross and histopathological changes of the IBV on the chicken trachea and kidney tissues.

Materials and Methods

In the south of Basra Governorate, a five thousand broiler flock showed respiratory disease signs and high mortality, in the Petro District in May 2021. The broiler farm revealed signs of sneezing and lacrimation with a morbidity rate of 70% and a mortality

rate of 30% at 14-day olds ages. At necropsy, the main lesions found were tracheitis with caseous material at the tracheal bifurcation, lung congestion, airsacculitis, and enlarged kidneys.

Tracheal and kidney Samples were collected from 100 broiler chickens that showed clinical signs suggesting IB infection and transported to the pathology laboratory at the University of Basrah / college of veterinary medicine for histopathological study. All of the collected samples were kept in formal aldehyde of concentration of 10 % for 72 hours then it was placed in ethanol of concentration of 70% and processed with histological preparation (Bancroft *et al.*,2019).

Results and discussion

The clinical findings of respiratory distress were demonstrated by, tracheal rales, sneezing, mouth breathing (Fig.1), and the birds were observed to die at their backs after a period of disturbances due to suffocation and the inability to breath (Fig. 2). Necropsy findings showed lesions of inflammation of the trachea, cheesy exudates in tracheal bifurcation (Fig.3). Also, there was congestion with enlargement of the kidneys. Mortality on the day of sampling (14 days of bird age) reach 30%. All these findings were related to IB as found by Bande *et al.*,(2016).



Figure1: respiratory distress(mouth breathing) of broiler chick naturally infected with IBV



Figur 2: 14 day broiler chick naturally infected with IBV observed died on their backs

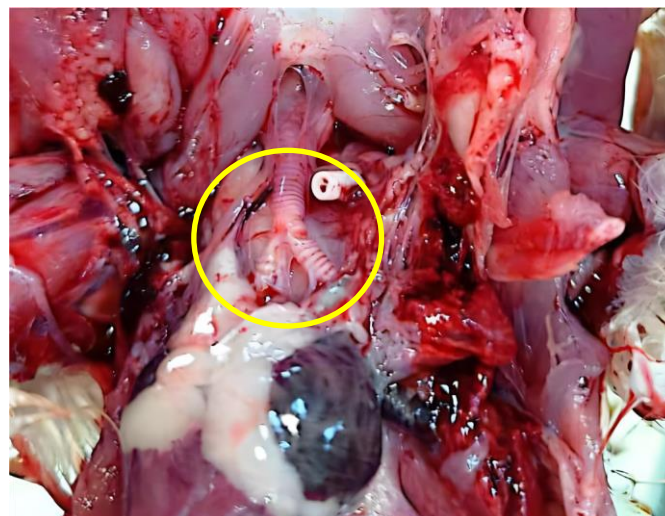


Figure 3: cheesy exudates in trachea bifurcation of 14 day broiler chicken naturally infected with IBV (yellow circle)

The histopathological analysis of tracheal tissue (Fig.4) showed a significant effect of IBV on the tracheal lumen (area of the mucosa and submucosa). The changes represented by epithelial cells losses with the cilia, thickening of epithelial areas due to severe hyperplasia, infiltration of heterophils, and disappearance of replacement of goblet cells with empty vacuoles. Also, there was fibrin and congestion in the subepithelial layer. The same findings were induced by Hasan *et al*, (2020). Also (Han

et al., 2017) recommended that the lesions occur due to the apoptotic effect of IBV on tissue cells. (Helena Grgić *et al.*, 2008) propose that the IBV is well related to several phases of tracheal hyperplasia. The pathological findings of renal tissue (Fig.5) revealed inflammatory changes, cellular degeneration lesions, and multiple corruption of the renal tubules. Also, there was disruption of glomeruli and infiltration of heterophils. In several locations, fibrin replacement of some tubular endothelial cells. Also narrowing of the lumen of the renal tubule due to cellular swelling with necrosis. The cellular necrosis and damages occur as a result of IBV replicate in the cells as was revealed by Lee *et al.*, (2004). renal tubular degeneration and acute necrosis of the epithelial layer of the trachea were also detected by Jang *et al.*, (2013) who determined that the great inflammatory reaction were stimulated by cytokines through IBV infection leading to damage in renal tissue.

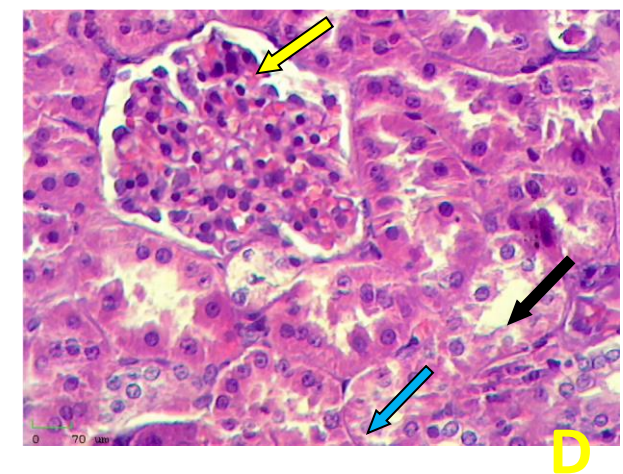
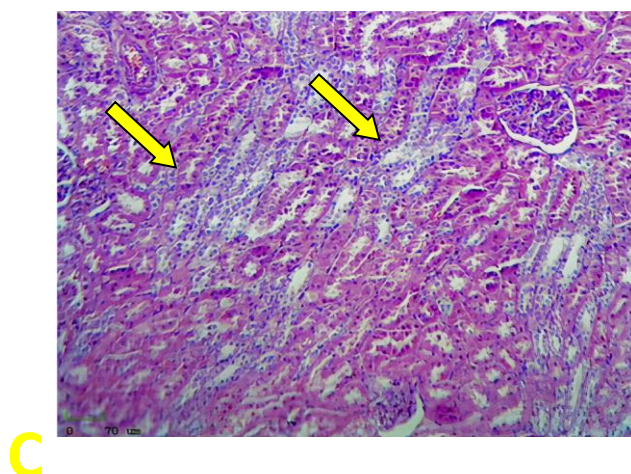
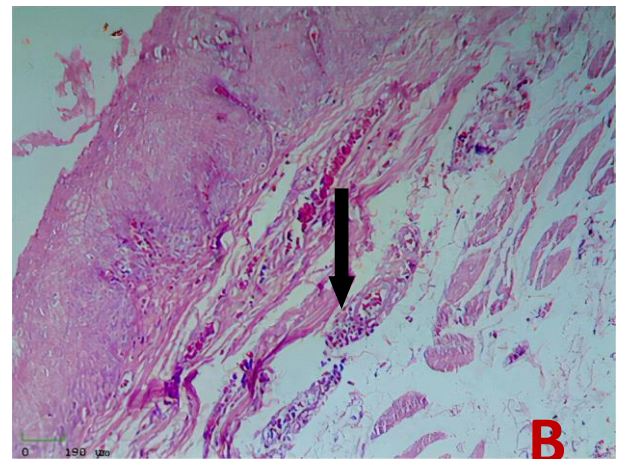
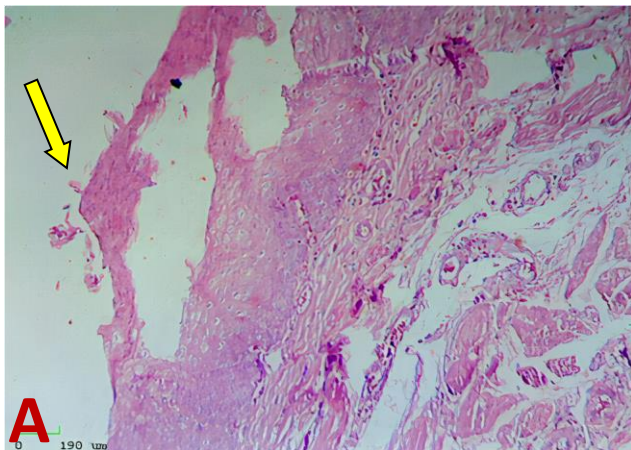


Figure 4: Histopathological changes in the trachea and kidney of naturally IBV infected broiler chicken
Note, A: Loss of cilia and acute necrosis of epithelial cells were observed in the trachea (yellow arrow), B: trachial section with marked infiltration of lymphocytes within the epithelia (black arrow), C: Kidney section of broiler chicken infected with IBV show dilatation of some renal tubules (yellow arrow), D: also the kidney show degeneration of epithelial cells (black arrow) with necrosis (blue arrow), and vacuolation of endothelial cells of glomeruli (yellow arrow).
H&E

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