A Field, Clinical and Histological Study of Omphalitis and Yolk Sac Diseases at Commercial Broiler Farms in Al-Muthanna Governorate

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ABSTRACT

The field study was conducted on broilers farms in Al Muthanna Governorate, a total of 22 thousand broiler chicks were used, distributed to the cities of Samawah, Rumaitha, Warka and Al Khader, 60 chicks were isolated and subjected to eye and histopathological examinations. These chicks were divided into three groups: The first group: chicks infected with omphalitis. The second group: chicks infected with yolk sac infection. The third group: uninfected chicks (control group). The results of the study indicated that the rate of infection and mortality in yolk sac infection was significantly higher (P \leq 0.05) compared to omphalitis, as for the pathological examinations, pathological changes were observed in the livers of infected chicks from paleness in the case of omphalitis and severe congestion in the case of infection of the yolk sac, the histopathological examinations, it was noted that there were degenerative changes in the hepatocytes in the case of omphalitis and necrotic changes in the case of infection of the yolk sac.

INTRODUCTION

Poultry farming has now become an industry, importance and influence in the economy of different countries. providing animal protein from meat and eggs, high nutritional value and affordable price, compared of the prices of meat and other animal products (Al-Gharawi, 2012). There has been a clear imbalance between the progress of the poultry industry and the quantity and quality of services provided by animal health to the field and laboratory breeders, the majority of breeders do not care the necessary importance to the health conditions of breeding m, ensuring good housing for birds and adhering to the conditions of breeding and disease prevention, this was due to the cultural and artistic poverty of some of them, and their desire to get the profit in the fastest time and at the lowest cost (Naji et al., 2012). It reflected negatively on the poultry industry because the large and small breeders, not rely on the service and expertise of technicians, including agricultural engineers and veterinarians, which led to the spread of many diseases of poultry, especially those that cause great economic loss to the poultry industry (Al-Fayyad and Naji, 1989). Therefore, this study aims to study both omphalitis and yolk sac at the field, and knowledge of the clinical and histological effects, it was the first field study to be conducted under the reality of commercial fields in Al-Muthanna Governorate.

MATERIAL AND METHODS

Study sites

The study was conducted in different locations for broiler fields in the regions of (Samawah, Rumaitha, Warka and Al Khader), for the period from October to December 2019, as this study relied on examining infected broiler chicks, make sure of infection with omphalitis and yolk sac, some of the infected samples were taken to the Physiology Laboratory of the Faculty of Agriculture, Al-Muthanna University. **Keywords:** Field, clinical, histological, omphalitis, yolk sac diseases, commercial broiler farms, Al-Muthanna Governorate.

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Recording injury ratios

During the study period, statistics were taken on the percentages of infection rates of omphalitis and yolk sac infection for a number of fields located in Al-Muthanna Governorate, by conducting a field survey of these fields and viewing the affected cases, and the conduct of autopsy on the decayed chicks, as well as a statistical procedure on the mortality resulting from these diseases, it has also been emphasized that most of the broiler chicks used for breeding, was brought from the private hatcheries located at Al-Muthanna Governorate.

Sample collection

A total of 60 samples were taken from broiler chicks at the age of 5 days and were divided into three groups: **First group:** Chicks infected with omphalitis, (20 chicks). **The second group:** chicks infected with yolk sac infection, (20 chicks). **The third group:** uninfected chicks, which were considered as a control group, (20 chicks).

Histological test of chick's livers

Immediately after dissecting the chicks, livers samples were taken, placed in preservation and fixation solution, it is a 10% neutral buffer formalin solution to stabilize (Sarma *et al.*, 1985), histological clips were prepared following the method, the steps described by Uni *et al.* (1999) and (Bancroft and Gamble, 2008) by following the following steps:

Fixation of samples

The samples were placed in a Bouin's Fixative, the preparation is from a mixture of 75 ml of aqueous saturated Bicric acid, with 20ml of formalin at 40% concentration, and 5 ml of Glacial acetic acid.

Wash samples

Fixed samples were washed with running water for two hours, as the water is replaced every quarter of an hour to get rid of the formalin or yellow color of Boun's solution.

Dehydration process

The operation was performed to remove all the water from the tissue, using an ascending series of Absolute ethanol, were 70%, 80%, 90%, 95% for two hours for each concentration.

Cleraing

Samples were cleraing for the purpose of removing alcohol residual in the tissue from the previous process, as well as adding transparency to the tissue, and also remove unwanted fats, two types of thinners were used, the first is chlorophorme, which is a volatile and narcotic substance, then the tissue was immersed in it after the last concentration of alcohol concentrations for a period of 8-6 hours, as for the second type, it was xylene, which was a derivative of benzene and a fat-solvent, the life of the tissue in xylene for a period ranging between 2 to 3 hours.

Infilitration and embedding with paraffin wax

In order to completely saturate the fabric with wax and fill in the voids in the fabric, by preparing molds containing paraffin wax with a melting point of 58-56 C.

The shredding processes

After making the container wax molds, the study samples cut out the models.

Using a special roturymictome device to cut tissue slides with a thickness of 5 μm for each.

Homogenize and load slides

The slides were placed for 5 minutes in a water bath at a temperature of 52 ° C, for the homogenizing the slides, remove the bends caused by cutting and completely stretch the wax in the tissue, the tissue were then lifted, held and attached to lightly coated glass slides of Mayers albumin, then the slides were dried from the material using a Hot plate fixed at 40 ° C for a period of 24 hours. **Tissue dye**

Tissues were stained with Harries-Hematoxyline and Eosin, according to Uni *et al.* (1999), then the glass covers were placed on the slides, after covering with glass covers, DPX was applied to it and then the slides were ready for microscopic test.

Histological slides test

By using the Compound Microscop, prepared histological slides were tested, all measurements were recorded using an ocular micrometer with a magnification power of 400 x after being calibrated with a stage micrometer, to give true value in microns (Uni *et al.*, 1999).

Statistical Analysis:

A Completely Randomized Design (CRD) was used, to study the effect of different parameters on the studied traits, significant differences between the means were compared with the Duncan (1955) multiple range test under 0.05 significance level, the SAS (2001) program was used for statistical analysis.

RESULTS AND DISCUSSION

Percentage of omphalitis and yolk sac infection:

Table (1) shows that the percentage of infection with omphalitis and yolk sac in broiler fields in different areas of broiler meat, it was noticed that all fields in which the study was conducted had a significant increase ($P \le 0.05$) in the percentage of incidence of yolk sac infection compared to the percentage of omphalitis, as the percentage of yolk sac infection and omphalitis in chicken meat fields located in the city of Samawah (22.35 and 18.18)%, while the percentage in Rumaitha (20.66 and 15.58)%, at Warka (23.78 and 19.82)%, and at Al Khader (27.85 and 21.22)%, respectively, the highest proportions were in the city of Al-Khader, and it may be due to the distance of this city from the hatcheries that supply these fields with chicks.

Yolk Sac Omphalitis Chicks **Region Study** Percent Sig. number percent (%) <u>(%)</u> Samawah 8000 18.18b 0.05 22.35a 5000 15.58b 0.05 Rumaitha 20.66a Warka 5000 19.82b 23.78a 0.05 Al-Khader 4000 21.22b 27.85a 0.05

Table 1. The percentage of infection with omphalitis and yolk sac in broiler fields in different region in Al-Muthanna governorate.

Percentage of mortality due to omphalitis and yolk sac

Table (2) shows the percentage of mortality resulting from omphalitis and yolk sac in chicken meat fields in different region of Al-Muthanna Governorate, noticed that the mortality resulting from the yolk sac increased significantly (P \leq 0.05) compared to the mortality resulting from omphalitis, as the mortality Samawah was 5.18 and 3.32%, while it was noted that the mortality in Rumaitha

was 3.55 and 2.43%, Warka was 6.11 and 3.03% and Al-Khader, was 7.17 and 4.86%, respectively, the mortality rate resulting from the disease of the the yolk sac is higher than that caused by omphalitis, this was a normal result of the percentage of infection with the same diseases (Table 1), it was also noticed that the city of Al-Khader has given the highest mortality rates due to the distance of the city from the hatcheries equipped for broiler chicks.

Table 2. The percentage of mortality with omphalitis and yolk sac in broiler fields in different region in Al-Muthanna

| governorate. | | | | |
|--------------|------------------|---------------------------|----------------------------|------|
| Region Study | Chicks number | Omphalitis percent (%) | Yolk Sac Percent (%) | Sig. |
| Samawah | 8000 | 3.32b | 5.18a | 0.05 |
| Rumaitha | 5000 | 2.43b | 3.55a | 0.05 |
| Warka | 5000 | 3.03b | 6.11a | 0.05 |
| Al-Khader | 4000 | 4.86b | 7.17a | 0.05 |

Anatomical pathological changes

After conducting the anatomical characteristic of the lost broiler chicks and making sure of their infection, satisfactory changes were observed by viewing the mortality, noticed that there was a clear infection in the navel area (Picture 1B), and the navel is black and moist with an unpleasant odor compared to healthy chicks (Picture 1A), while the symptoms were observed in the case of infection of the yolk sac, the yolk is not absorbed, and the yolk color is dark and has an unpleasant odor (Figures 2 A and B). It is also noted that there were certain pathological changes in the livers of these chicks, as the affected liver was noted pallor in the case of omphalitis (Picture 3A), while it was noticed that the liver has congested in the case of infection of the yolk sac (Picture 3B), compared of chicks with no symptoms of infection (Picture 3C).



Picture 1. Anatomical symptoms of omphalitis of broiler chicks, A shows the normal state of the navel (arrow indicator), and B shows the pathological condition of omphalitis in chicks.



Picture 2. Anatomical symptoms of yolk sac infection of broiler chicks, A external appearance of yolk sac infection disease (arrow indicator), and B form of infected yolk sac inside the body of broiler chicks.



Picture 3. Pathological changes of the liver in broiler chicks, A shows the normal color of the liver in (uninfected chicks), B shows the state of congestion of the liver (infection of the yolk sac), and C shows the state of paleness of the liver (omphalitis).

Histological changes

Histological sections of livers taken from omphalitis and yolk sac; thus, pathological changes were observed in the first group (the case of omphalitis). The histopathological changes represented by the presence of degenerative changes in the hepatocytes, most of them were characterized as vacuolar degeneration, with coagulative necrosis occurring in some of them (Picture 4 A and B). The histological test also revealed the presence of severe congestion of the central veins with enlargement and congestion of the sinuses, as well as a focal infiltration of inflection mononuclear cells and lymphocytes around the portal space (Picture 5 A and B), while no tissue change was observed in the livers of the third group (uninfected chicks) (Picture 6 A and B).



Picture 4. Pathological changes of the liver tissue of broiler chicks, A shows the presence of thrombophlebitis in omphalitis disease (arrow indicator), and B shows the state of congestion of the sinuses in yolk sac infection disease (arrow indicator).



Picture 5. Pathological changes in the liver tissue of broiler chicks, A shows the presence of focal infiltration of mononuclear inflection cells and lymphocytes around the portal area in omphalitis disease (arrow indicator), B shows the normal state of liver tissue in uninfected chicks (arrow indicator).



Image 6. The normal histological structure of broiler chicks liver tissue, showing the normal structure of liver tissue in which the portal duct appears (blue arrow indicator), the presence of the hepatic artery (red arrow indicator), and the hepatic portal vein (yellow arrow indicator).

Many broiler chicks were infected with omphalitis and yolk sac, these cases lead to the presence of pathological changes in the rest of the internal organs, whether it was the intestine, kidney or liver (Buhr *et al.*, 2005).

Researchers have stated that infection of the yolk sac may cause pericarditis, both omphalitis and yolk sac lead to many pathologies, especially salmonella, *staphylococcus*

aureus, streptococcus, *Escherichia coli*, and fungi (Anjum, 1997).

The results of the study showed that the liver was affected by clinical and histological changes, the severity of which differed according to the type of injury, the reason for this may be caused by blood disorders in the chicks and caused by pathological bacterial infections, or as a result of poor management and lack of ventilation in the breeding halls of broilers, which causes a lack of oxygen in the chicks' body, leads to congestion of the liver tissue (Mulei and Atwell, 1984).

As for hepatocyte necrosis, it may be the result of a direct influence of pathogen toxins, or as a result of poisoning with some materials contaminating the feed, such as mycotoxins, causing changes in the cell, including the failure of oxygen to reach the hepatocytes, as well as causing blockage of blood vessels, or as a result of the indirect effect of toxic substances, leads to the death of cells, either by clotting their contents or by interfering with the action of enzymes (Kumar *et al.*, 1997). As for infiltration of inection lymphocytes and mononuclear cells, occurs as a result of disease or chemicaltaxisis, causing heavy leaching of these cells (Ekataksin and Kaneda, 1999).

CONCLUSION

The application of strict health care measures for the mothers' flocks until the stage of egg collection and transfer to the hatching laboratories. Disinfecting eggshells before storing them in the coolers, it is preferable to use an active iodine-based disinfectant. Good disinfection of incubators, hatcheries, and all tools that come into contact with eggs, with an emphasis on removing all waste and organic materials from the incubation machines before carrying out any disinfection process. Taking into account the constant verification of temperature and humidity during the incubation period, especially that excess moisture above the required rate leads to a rapid dehydration after hatching, as a result, the navel does not heal and is easily exposed to infection. It is preferable to wash the hatching machines and chickens' cages in hot water (60 ° C) under pressure, to get rid of all the residues contaminated with it, especially since there is a scientific fact that a good laundry is a suitable detergent and hot running water is sufficient to eliminate 90-95% of surface pollution.

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