

**Study on Gross and Microscopic Lesions of Infectious Bursal
Disease (IBD) or Gumboro Disease in Broiler Chicken with
Diagnosis and Therapeutic Management**



**A clinical report submitted for the requirement of the partial fulfilment
of the Internship Programme for the Degree of Doctor of Veterinary
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Diagnosis and Therapeutic Management**



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List of abbreviations

| Abbreviation | Elaboration |
|---------------------|---------------------------|
| IBD | Infectious Bursal Disease |
| gm | gram |
| L | Liter |
| ml | milliliter |
| @ | at a rate of |

Abstract

Infectious Bursal Disease (IBD) or Gumboro is an immunosuppressive disease caused by a virus under the genus *Avibirnavirus* of the family *Birnaviridae* that affects 3 to 6 weeks old chickens more commonly. On August 17, 2023, an outbreak of Gumboro disease was found at a broiler farm in the Chattogram Metropolitan Area. There were 1500 broiler chickens in the flock and they were 25 days old. The flock's average body weight was between 1200 to 1300gm. Suddenly 60 birds died within 3 days. Anorexia, trembling, ruffled feathers, white & watery diarrhoea, dehydration, huddling, vent pecking and depression were the clinical signs that were noticed in the flock. By performing postmortem examination, there found enlarged and edematous bursa of fabricius with pin point haemorrhages in the mucosal fold of bursal wall. The kidneys were also inflamed. It appeared swollen & discolored with deposition of urates. The permanent slides were prepared for examination. Some microscopic lesions were visible on the permanent slide of several samples, including the bursa of fabricius, spleen, and kidney. The lesions were fewer lymphocytes in bursa of fabricius and spleen. Also vascular congestion in the renal blood vessels could be observed under a microscope. Though it was a viral disease, there was no any specific treatment for this disease but to prevent the secondary bacterial infections, antibiotics were used. The treatment was given with combination of Flouroquinolones (Ciprofloxacin) and Aminoglycosides (Neomycin) as antibiotic. Immune stimulator and anti-stress elements, toxin binder, kidney tonic and vitamin C were also used as a supportive drugs. Additionally, some guidance on biosecurity precautions was provided. The treatment produced a satisfactory result. After few days, the birds' conditions gradually improved and their deaths stopped. Mortality did not exist anymore.

Keywords: Infectious bursal disease, congestion, hemorrhage, therapeutic management.

CHAPTER - I

Introduction

Bangladesh's poultry industry is one of its most promising industries. This sector can offer a number of ways to increase GDP growth rates and promote equitable distribution by ensuring food security, developing self-employment, raising purchasing power, and significantly lowering rates of poverty (Khairu Islam et al., 2014).

A significant source of employment in rural areas is livestock farming. Millions of people involved in animal husbandry, poultry farming, and dairy production, among other forms of livestock rearing, depend on it for their livelihood. Bangladesh's poultry industry is expanding rapidly and plays a vital role to the nation's agricultural and economic systems. Bangladesh's agriculture and economy now depends heavily on poultry farming. In addition to improving food security, it offers people an inexpensive source of protein. Bangladesh is producing a significant amount of chicken meat and eggs, and its poultry industry is expanding. Due to changing dietary habits, the per capita consumption of poultry products, such as chicken and eggs, has been rising gradually. In both rural and urban areas, poultry farming is common. Although conventional backyard farming is still popular in rural regions, commercial poultry farms—which include both large- and small-scale operations—are becoming more prevalent. Particularly in rural areas, the poultry industry contributes significantly to employment. Millions of people who work in production, distribution, and sales of poultry earn a living from it. In order to guarantee the quality and safety of poultry products and to promote growth, the government of Bangladesh has established a number of policies and initiatives to support the poultry industry. This sector has been progressively implementing modern farming techniques and technologies to boost output and lower the risk of illness. Better management techniques, vaccination programs, and the adoption of enhanced breeds are all examples of this. Bangladesh has the capacity to become a regional exporter of poultry products. It is crucial to adhere to international quality and safety standards in order to access export markets.

Total number of chicken is 3196.89 lakh in Bangladesh (DLS 2022). The contribution of poultry in the National Economy of Bangladesh is 20% (directly employment) and 50% (partly employment). Total production of meat is 87.10 Lakh Metric Ton and egg is 2337.63 crore number in 2022-23 (DLS 2022).

The two major types of poultry in Bangladesh are layers, or chickens that lay eggs, and broilers, or chickens that produce meat. The poultry industry in Bangladesh is expanding, but it still faces many obstacles, such as disease outbreaks (like avian influenza), growing feed prices, and worries about food safety and quality control. Improvements in biosecurity and regulatory measures have been spurred by these difficulties. As chickens raised for meat production, broilers are vulnerable to a number of diseases that could negatively affect both their health and the overall financial success of the broiler farming industry.

There are many diseases of broiler chicken are found in our country like Gumboro disease, Newcastle disease, Avian influenza, Infectious bronchitis, Necrotic enteritis, E-coli infections, Coccidiosis, Ascites etc. Among them, Gumboro is one of the most infectious disease of broiler chicken in our country.

Gumboro disease is caused by the Infectious Bursal Disease Virus under the genus *Avibirnavirus* of the family *Birnaviridae*. The organ that is in responsible for immune cell development, the bursa of Fabricius, is the main target. Immunosuppression, higher mortality, and slower growth rates are some of the symptoms that infected broilers can show. A vital preventive strategy is vaccination.

The clinical effects only affect young birds. Birds aged 0–3 weeks are more likely to have a less acute or subclinical disease, but severe acute diseases in this age group are related with high mortality. Because of the virus's effect on the Bursa of Fabricius, this may result in secondary issues. The humoral antibody response may be significantly lowered if the IBD virus causes lymphoid depletion of the bursa during the first two weeks of life. There are two identified IBDV serotypes, referred to as serotypes 1 and 2. Only serotype 1 has been related to clinical diseases, and all commercial vaccines are designed to prevent this serotype. Serious disease is being caused by highly virulent strains of classical serotype 1 that are becoming common in multiple countries. Clinical disease caused by IBDV infection, commonly referred to as Gumboro disease, is usually diagnosed by combining particular clinical signs with post-mortem lesions. It is recommended that an efficient breeder vaccination program, an efficient biosecurity program, and an efficient broiler vaccination program should be included in any program intended to prevent and control IBD (Teshome et al., 2015).

CHAPTER - II

Case Presentation

2.1. Case History

On August 17, 2023, a commercial broiler chicken farm in the Chattogram Metropolitan Area reported an outbreak of Gumboro disease. The owners' complaint had been recorded. There were 1500 broiler chickens in the flock, and they were 25 days old. The flock's average body weight was between 1200 to 1300gm. In the previous three days, 60 birds from the flock died suddenly. Anorexia, trembling, ruffled feathers, white & watery diarrhoea, dehydration, huddling, vent pecking and depression were the clinical signs that were noticed in the flock. Dead chickens were found scattered throughout the farms. There was a history of regular vaccinations for that flock.

2.2. Clinical Diagnosis

Diagnoses were made by taking history from owner, observing clinical signs and doing postmortems on diseased chickens.

2.2.1. Clinical Signs

Following clinical signs were observed in the flock:

- Sudden increased mortality.
- Depression, anorexia & weakness.
- White & watery diarrhoea, dehydration and weight loss.
- Ruffled feathers.
- Huddling and vent picking etc.

2.2.2. Postmortem examination

The diagnosis of diseased chickens was established by postmortem examination and the gross lesions were then observed.

The bursa of fabricius of infected chickens were enlarged and edematous. Pin point haemorrhages were also found in the mucosal folds of bursal wall. Kidney lesions were also being present, characterized by petechial haemorrhages and inflammation. The kidneys appeared swollen & discolored with deposition of urates. Following postmortem examination, Gumboro disease was tentatively diagnosed based on the observation of the gross lesions.



Figure 1: Hemorrhages in mucosal fold of bursa.



Figure 2: Swollen & edematous bursa.



Figure 3: Hemorrhagic & inflamed kidney.

2.2.3. Microscopic Lesions

Samples such as bursa of fabricius, kidneys were collected for comprehensive study on microscopic or histopathological lesions of IBD. After that, the samples' permanent slides were made, and the lesions were examined.

There were markedly fewer lymphocytes in the Fabricius bursa. Moreover, the bursa of Fabiocius in the Gumboro-infected broilers showed signs of severe necrosis, disorganization, depopulation, and lymphocyte depletion in their follicles. Hemorrhages within the bursal tissue were found under a microscope. Necrosis was observed in the follicles and their surroundings due to hemorrhages. Oedema or accumulation of fluid in the bursal tissue also be observed. Affected areas of the bursa could show inflammatory changes, such as the infiltration of inflammatory cells such as mononuclear cells and heterophils.

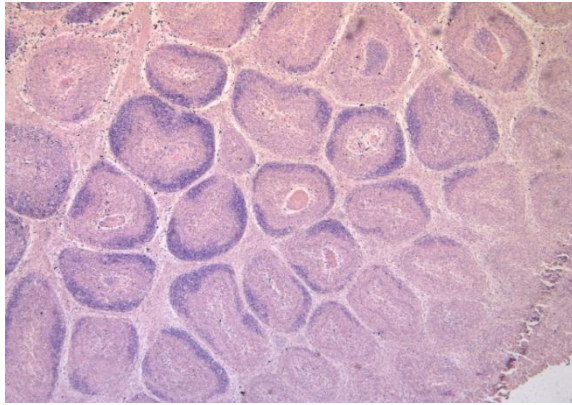


Figure 4: Lesions in histopathological slide of bursa (4X).

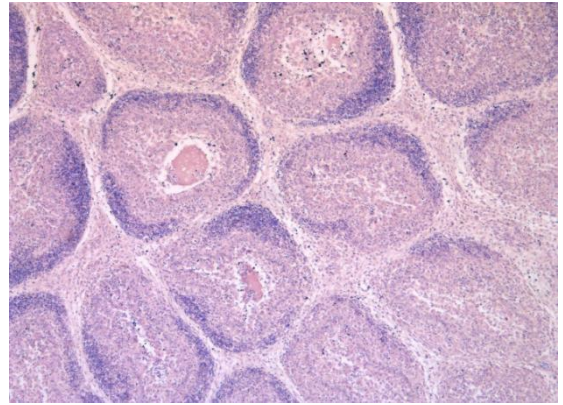


Figure 5: Lesions in histopathological slides of bursa (10X).

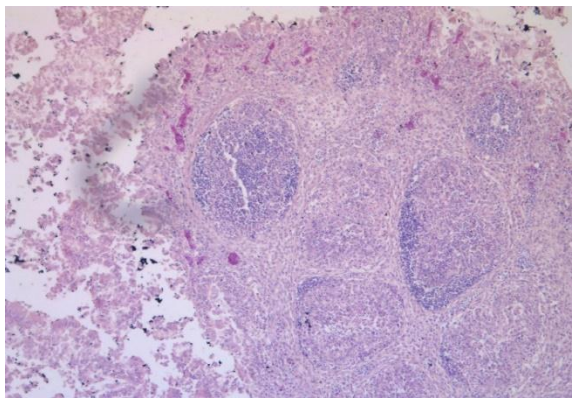


Figure 6: Lesions in histopathological slide of bursa (Cross section, 4X).

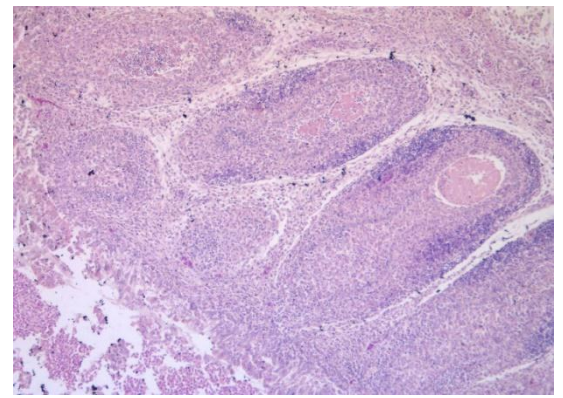


Figure 7: Lesions in histopathological slides of bursa (Cross section, 10X).

The spleen of broilers infected with gumboro had particularly fewer lymphocytes. Both the white pulp and the red pulp showed signs of lymphatic depletion, with the white pulp showing particularly severe lymphatic tissue in its germinal centers.

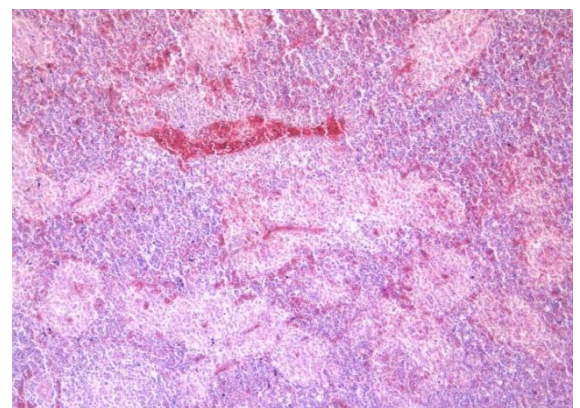
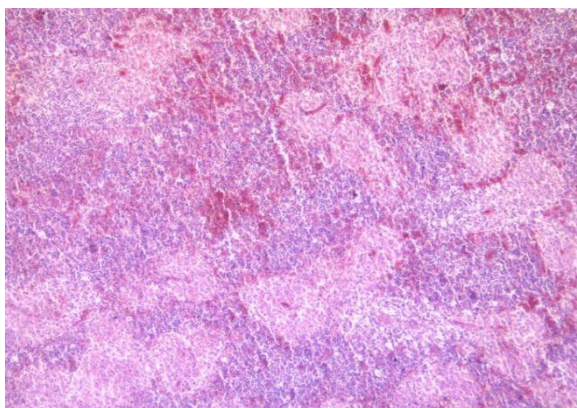


Figure 8: Lesions in histopathological slides of spleen (4X).

In kidney, microscopic lesions were also observed in case of gumboro affected chickens. Vascular congestion in the renal blood vessels could be observed under a microscope. This congestion is often associated with the inflammatory response and increased permeability of blood vessels. In the interstitial spaces of the renal tissue, inflammatory cells such as mononuclear cells and heterophils may be infiltrated.

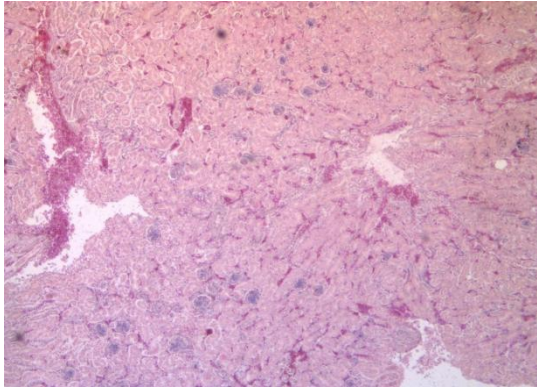


Figure 9: Lesions in histopathological slides of kidney (4X).

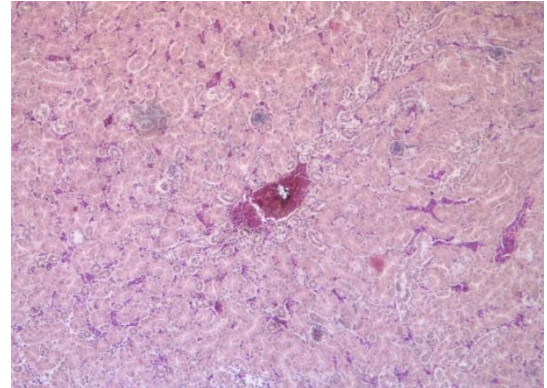


Figure 10: Lesions in histopathological slides of kidney (10X).

2.3 Therapeutic Management

The following methods of therapeutic management were applied to the flocks:

Combination of Ciprofloxacin (Pulv. CFCIN vet @ 1gm/1L drinking water) and neomycin (Pulv. Neoxel vet @ 1gm/2L drinking water) as antibiotic, Anti-stress element and immune stimulator (Pulv. Lisovit @ 1gm/2L drinking water), Toxin binder (Liq. Two plus @ 1ml/2L drinking water), Kidney tonic (Liq. Nephro-Fit @ 1ml/1L drinking water) and Vitamin C (Liq. Envit-C @ 2ml/1L drinking water).

The farmer received some advice on how to prevent disease exposure in the flock, including giving clean drinking water, making sure that biosecurity measures are restricted, like having a foot bath in front of the farm, limiting people's access, and so on.

CHAPTER - III

Results

Five days later, on August 22, 2023, the farm was visited to evaluate the disease's current condition.

The condition of the birds gradually improved, and their deaths had stopped. The treatment produced a satisfactory result. According to the owner, mortality no longer exists at all.

The farmer also followed the guidelines in order to maintain the health of his farm. It could be the reason for the quick response to the treatment.

CHAPTER - IV

Discussion

The disease was diagnosed in this study based on the flock history, clinical signs, and postmortem examination.

Clinical signs including depression, anorexia, trembling, white & watery diarrhoea, dehydration, ruffled feathers were found in case of this case of IBD. These signs related to (Kegne et al., 2014)'s and (Mutinda et al., 2013)'s findings. Another significant sign of IBD like huddling and vent picking were also seen in the flock and this sign also matched more closely to (Franciocini et al., 2022)'s findings.

Gross pathological lesions included the bursa of fabricius of infected chickens were enlarged and edematous. Pin point haemorrhages were also found in the mucosal folds of bursal wall. Those are related to findings of (Pathak et al., 2022).

The permanent slides were prepared for thorough examination. Some microscopic lesions were visible on the permanent slide of several samples, including the bursa of fabricius, spleen, and kidney. The lesions were fewer lymphocytes in bursa of fabricius and spleen. Similar lesions could be found in (con Gumboro et al., 2022).

After diagnosis, the treatment was given such as Sulfonamides as antibiotic, Anti-stress element and immune stimulator, antiviral element, mucolytic agent and Vitamin A, D3, E preparation. Some advise was offered to the farmer, such as providing clean drinking water, ensuring restricted biosecurity measures, such as having a foot bath in front of the farm, limiting people's access, and so on, in order to prevent disease exposure in the flock.

The outcome of the treatment was satisfactory. The birds' condition progressively became better, and the deaths of the birds had ceased happening. There was no longer any mortality. The farmer also followed the advised biosecurity measures that might be a cause of the treatment's rapid response.

CHAPTER - V

Limitation

There were 1500 chickens on the one farm where the study was conducted. The diagnosis was established through the post-mortem examination. There was not a serological test performed.

There is no specific antiviral treatment for Gumboro disease, so managing infected birds primarily involves supportive care and prevention measures. As a result, treatment and follow-up were carried out in order to evaluate treatment responsiveness.

CHAPTER - VI

Conclusion

Gumboro disease is a highly contagious viral infection that primarily affects young chickens, leading to immunosuppression, high mortality rates, and reduced productivity. Prevention and control strategies are essential in managing the disease, including vaccination, biosecurity measures, and early detection. The economic impact of Gumboro disease outbreaks can be severe, affecting farm profitability and overall industry stability. Continuous monitoring of the virus's prevalence and vaccine efficacy is vital to adapt control measures effectively. Proper actions are needed to address Gumboro disease effectively like as strengthen biosecurity measures on poultry farms to prevent the introduction and spread of the virus. Regularly assess and update vaccination programs in consultation with veterinarians and poultry health experts. Enhance research and surveillance efforts to monitor the evolution of the virus and improve control strategies. The purpose of this study was to gain more knowledge into the diagnosis and treatment of Gumboro disease in chicken flocks. The case had been observed to evaluate the effectiveness of the treatment in an effort to stop the disease from returning to the farm. As a result, the study would be beneficial for additional research.

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Biography

This is Raquibul Hasan Raquib, the most minor child of Abdul Aziz and Ayesha Khatun. He is pursuing Doctor of Veterinary Medicine (DVM) at Chattogram Veterinary and Animal Sciences University under the Faculty of Veterinary Medicine. He passed the Secondary School Certificate Examination (SSC) in 2015 from Sushung Adarsha Bidya Niketon, Durgapur, Netrokona with a GPA of 5.00. He also passed the Higher Secondary Certificate Examination (HSC) in 2017 from the Shahid Syed Nazrul Islam College, Mymensingh, with a GPA of 4.75 out of 5.00. Currently, he is doing his year-long internship. He is highly enthusiastic about his field of study and aims to develop practical skills and knowledge to prepare for the modern era of science.