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Measuring the Frequency of Gumboro Disease in Poultry Based on Sample Submission from Different Farms and Diagnostic Protocol Used in Central Disease Investigation Laboratory Dhaka, Bangladesh

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Abstract: The present study was carried out during a period of four months at Central Disease Investigation Laboratory, Dhaka with the primary aim to measure the frequency of Gumboro in poultry based on sample submission and diagnostic protocol they have been using for poultry disease surveillance. The birds >30 days had a more frequency of Gumboro and the mortality was also comparatively higher in these group (15.66 risk ratio and 4.65 rate ratio). BV 300 strain was affected at a relatively higher rate and among the production group layer was evidenced to be more susceptible than broiler to IBD infection.

Key words: Disease frequency, Gumboro, poultry, diagnostic protocol, morbidity, mortality, rate ratio, age, production group

Introduction

Poultry rearing is one of the growing and promising industries in Bangladesh. Agriculture generated 39% of the GDP of which the contribution of livestock sub-sector comes about 28% (Brammer *et al*., 1996). However with increasing population and decreasing land holdings, the number of poultry is increasing at an annual rate of 5.9% (Huque *et al*.,). According to the Directorate of Livestock Services (DLS), there were 47,168 chicken and 26,944 duck farms of 50 to 100000 birds capacities have been established round the country within 1996 (Rahman, 1996).

Protein deficiency has been taken as the major contributory factor in malnutrition. Over the years, poultry meat and eggs have become important source of protein in Bangladesh. In this situation hybrid poultry raising appears to be a good means to complement the demand for protein deficit. Poultry meat alone contributes 29% of the total meat in Bangladesh. (Karim *et al*.,). With a view to meet the protein gap with a shortest possible time, a number of poultry farms have been established on commercial basis in and around the cities and towns and are operated under intensive management. Poultry not only provides protein but also provides full time employment to about 20% of the population and about 50% people are associated with this sub-sector as part timers. (Karim *et al.,)*. Moreover poultry farming is a quick returnable enterprise. However, one of the major constraints in the development of poultry industries is the out-break of the diseases. Among the prevalence of other poultry diseases infectious bursal disease (IBD) is an important viral disease of poultry throughout the world. In clinical forms, absolute morbidity may reach as high as 100% while usual mortality reported to be 20-30% (Rahman *et al.,* 1996). Being an immunosuppressive disease IBD has been a continuous threat and adversely affects the raising poultry industry in Bangladesh, in absence of any effective treatment, control and preventive measure if adopted right in time could be proved to be effective. However, to reduce the rapid spreading of the disease, early diagnosis is of paramount importance. In our country, diagnosis of IBD is mostly of presumptive and based on history, clinical signs and post mortem examination. Having the limitation of lab diagnostic facilities at field level, almost all of the poultry practitioners diagnose the disease on the basis of post mortem findings along with the presenting clinical signs. Any attempt to make confirmatory diagnosis through Isolation and identification of the causal virus is not very usual practice as it involves some expensive laboratory tests. However, Central Disease Investigation Laboratory (CDIL), being the center of government reference diagnostic laboratory, samples and referral cases round the country are submitted at regular basis. The present study was therefore undertaken with the objective of measuring the frequency of IBD around Dhaka Metropolitan Area based on submitted sample for a definite period of time.

Materials and Methods

Reference Population: All layer and broiler farms in and around the Dhaka Metropolitan Area.

Selection of study population: The study area was selected based on the submission of cases or case registration from govt. or private layer or broiler farms around the metropolitan city covering Gazipur, Savar, Monsigonj and Narayan Gonj.

Place and period of study: The study was carried out in the Central Disease Investigation Laboratory (CDIL), Dhaka, for a period of 01 January to 30 April 2002 (4 months).

Sampling: Samples from 14 different layer and broiler farms were submitted during the study period.

Working Case definition: In the present study a case of Gumboro was considered only when the birds had at least first three of the following Clinical signs including:

- ✓ ruffled feathers, depression, loss of appetite,
- ✓ whitish watery diarrhea, soiled vents, reluctance to move,
- ✓ closed eyes, death as Clinical Signs (Owner's complaint)
- ✓ dehydrated carcass,

and the first two lesions evidenced at Post-Mortem including :

- ✓ petechial hemorrhage in the leg and thigh muscle, occasionally on the mucosa of the proventriculus,
- ✓ enlarged, inflamed bursa with edematous, hemorrhages in the internal and serosal surfaces,
- ✓ caseous mass also found within the bursa,
- ✓ swollen liver and kidney
- ✓ gelatinous film formation around the bursa as PM findings.

Methods being used to collect data at CDIL (Existing Protocol): The CDIL maintained a designed traditional format for keeping records starting from registration up to production of diagnostic reports. The traditional format was used for the present study. The different sections of the form have got space to record information on identification related information, general management information, clinical signs, morbidity and mortality, post mortem findings, laboratory findings. However, the diagnosis and exploration of etiological clue is usually undersigned and authenticated by the duty scientific officers. Although there are some diagnostic techniques like Virus Neutralization (VN) test, Agar Gel immunodiffusion (AGID) test and Enzyme Linked Immunosorbent Assay (ELISA) etc. for isolation and identification of bursal disease, practiced all over world including Bangladesh, but at CDIL commonly diagnosis of Gumboro disease is made on the basis of history, clinical signs and PM findings.

Fig. 1: Caseous mass in Bursa

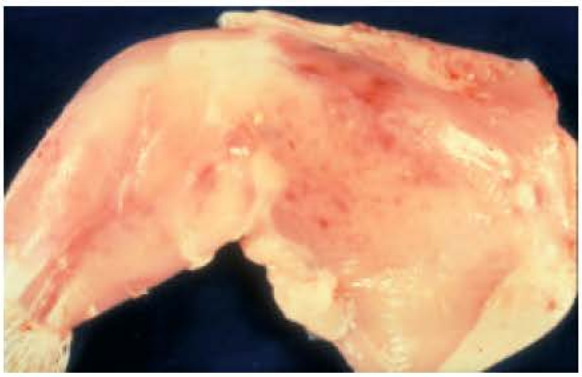


Fig. 2: Hemorrhage in thigh muscle

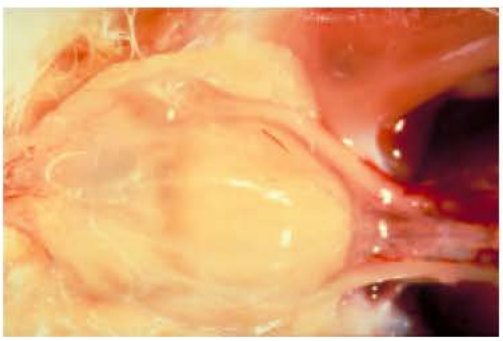
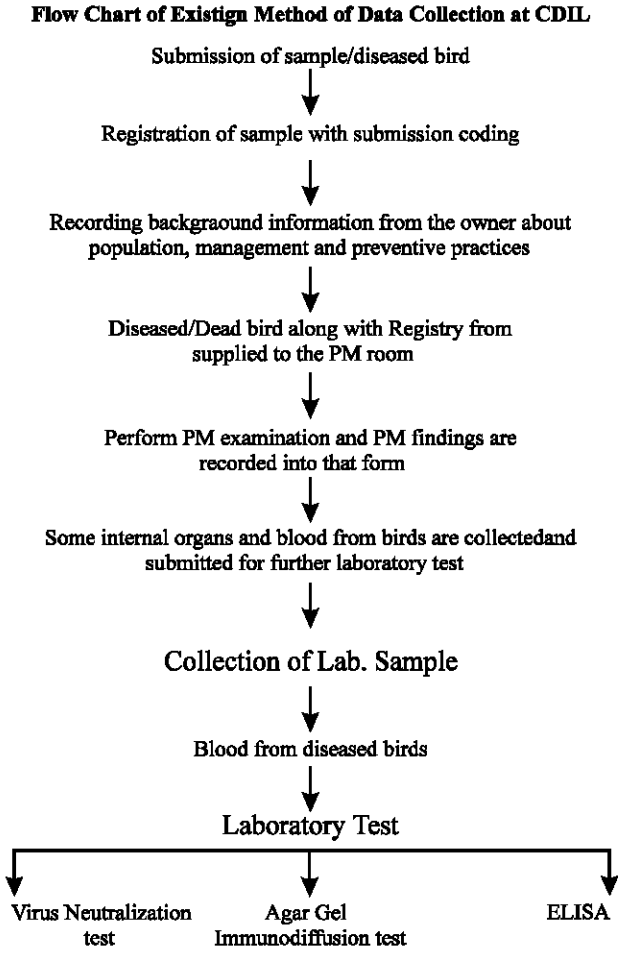


Fig. 3: Swollen Bursa

Data entry and analysis: The collected data were entered into a Microsoft Excel data sheet (MS Office XP). Data were sorted and checked for missing values, descriptive



analysis were carried out by using Statsol 1.0 ®, Stata 7.0.®. Measures of effects (Frequency and Risk Ratio) were calculated using the following formulae as according to Toma *et al.* (1999)

$$\text{Measures of disease frequency} = \frac{n}{N}$$

Where
n = Numbers of events
N = Population being studied

The results were expressed in percentage with 95% confidence interval and interpreted accordingly.

Result and Discussion

The morbidity and mortality of IBD in poultry as diagnosed at CDIL during the study period in different age group of birds has been presented in Table 1. Both morbidity and mortality was recorded comparatively higher (Rate ratio 15.66 and 4.65 respectively) in chicks aged over 30 days than chicks <30 days of age. About 60.37% morbidity was recorded in another study in chicks >2-8 weeks of age (Talha *et al.*, 2001). About 20-30% mortality among chicks of 4-5 weeks has also been reported elsewhere (Kumar *et al.*, 1984) Some of the earlier works did not find any variation in morbidity and mortality in different ages of poultry (Rahman *et al.*, 1996). However, age specific morbidity and mortality rate with

Table 1: Age specific Morbidity and Mortality rate of Gumboro. disease as diagnosed at CDIL during the study period

		Morbidity				Mortality			
Age group (day)	Population	No. of diseased birds	Rate 1000^{-1} birds	Rate Ratio	95% C.I.	No. of deaths	Rate 1000^{-1} birds	Rate Ratio	95% C.I.
10-20	3100	132	42.28	1.32	1.28-1.36	62	20.0	0.65	0.62-0.68
21-25	3600	829	230.27	7.20	7.06-7.34	76	21.1	0.69	0.66-0.72
26-30*	4000	128	32.00	1		123	30.75	1	
>30	2800	1400	500.00	15.66	15.31-15.93	400	142.85	4.65	4.65-4.74

Note: * indicate Baseline group.

Table 2: Breed/strain specific Morbidity and Mortality rates of Gumboro disease as diagnosed at CDIL during the study period

		Morbidity				Mortality			
Age group (day)	Population	No. of diseased birds	Rate 1000^{-1} birds	Rate Ratio	95% C.I.	No. of deaths	Rate 1000^{-1} birds	Rate Ratio	95% C.I.
Kasila	4500	863	185.78	0.62	0.62-0.62	100	22.22	0.25	0.24-0.25
Arbor	2200	115	52.27	0.17	0.16-0.17	100	45.45	0.51	0.50-0.52
BV 300	4800	1436	299.17	1.00		425	88.54	1.00	

Table 3: Morbidity and Mortality rates of Gumboro disease based on production type.

		Mortality			Morbidity		
Production Type	Population	No. of diseased birds	Rate 1000^{-1} birds	95% C.I.	No. of deaths	Rate 1000^{-1} birds	95% C.I.
Layer	6300	1509	239.52	479.04-479.04	438	69.52	491.65- 501.53
Broiler	7200	980	136.11	272.22-272.22	223	30.97	219.02- 223.42

IBD as evidenced in the present study could be influenced by the age of submitted sample or disparity between sample submission of different age group.

Among the different strains of the birds, the BV-300 had the higher morbidity and mortality (299.17/1000 birds and 88.54/1000 birds respectively). Arbor Acer was found relatively resistant to IBD (Table 2). The morbidity and mortality rates were also higher in layer birds than broiler. About 75 to 90% morbidity of different hi sex and crossed poultry breed has been recorded in earlier studies carried out in different regional poultry farms of Bangladesh (Rahman *et al*., 1996; Islam *et al*., 1998; Bhattacharjee *et al*., 1996). Breed or strain specific variation in morbidity and mortality may be due to failure of vaccine protection, maternal immunity, genetic resistance (Elankumaran *et al*., 2002)

Both morbidity and mortality rates were higher in layer than broiler. However, increase risk of morbidity and mortality rates usually were not affected by the production type. The results of the present study could be attributed by the respective managemental practices of different farms and preventive approach followed.

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