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Comparison of Genetic Susceptibility Between Local and Exotic Chickens Towards Gumboro Disease

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Abstract: Hypothetical remarks about the resistance of local native Bangladeshi chickens were compared with an exotic breed like Fayoumi towards Gumboro disease. A reserve experimental result was obtained with increased susceptibility of the locals than the exotics. Poor bursal enlargement along with the absence of many post-mortem lesions and peculiar hepatomegally were notable post-mortem lesions in locals. Maternal antibody attains a zero level as detected at 19 days of age by agar gel precipitation test. Materiality in locals 46% and exotic 38% was encountered in both the breeds following challenge with a virulent field isolate of Gumboro disease virus. Onset of morbidity proceeded in the locals. A spiking death curve was observed in both the breeds. Mortality started since day 2 following challenge and continued till day 5 except in the locals, where it ended on day 3 post challenge. It is assumed that changes in the method of feeding and rearing may act as natural stress affecting the cell-mediated immunity related to genetics and perhaps rendered them more susceptible.

Key words: Gumboro, hepatomegally, mortality

Introduction

Gumboro disease is the infectious viral disease of economic importance in chickens, producing a variety of syndromes from loss of feed efficiency (Lukert & Saif, 1991) to ablation of humoral immune response (Winterfield, 1972). A comprehensive observation report was first made in Bangladesh about the outbreak of Gumboro disease dealing with chickens of Government Central Poultry Farm at Dhaka in April 1992 and there were 8 outbreaks in a period of 11 months from 23rd April, 1992 to 28th March, 1993. The maladies involved Fayoumi breed of chickens and age of the affected birds varied from 2 to 16 weeks, mortality varied from 7.2% to 16.73% (Rahman *et al.*, 1996). A case record study performed at Central Diseases Investigation Center, Dhaka during the period of 1994-1995 reported about 11% cases of Gumboro disease in total necropsies Chickens (Bhattacharjee *et al.*, 1996).

Although intensive method of commercial poultry rearing is paramounting it's growth owing to increased production potentials but the native local chickens reared in backyard method of scavenging still occupies the lion share of poultry population of Bangladesh. Despite poor production output, the local chickens are assumed resistant to many infectious diseases. Experimental proof of a hypothesis like this was failed with Nigerian study where the local chickens were found more susceptible to Gumboro disease than the exotics (Okoye & Abulugba, 1996) and led them to abandon the idea of including the locals for future cross breeding program. The present study was undertaken to know whether the same scenario like Nigeria exists with the local breeds of Bangladeshi chickens against Gumboro disease.

Materials and Methods

The experiment was conducted in the Department of Microbiology of Sylhet Government Veterinary College, Tilagor, Sylhet, Bangladesh.

Chicks: About 100 Fayoumi and 120 local chicks were collected at 1 week age and reared under deep litter method. Fayoumi chicks had a parental history of vaccination against Gumboro before laying. Parents of local chicks were not vaccinated against Gumboro. Standard commercial pelleted layer starter feed was given to all birds except which get an extra supply of rice, provided to local chickens in an attempt of partial supplementation of their scavenging. All the birds

were vaccinated against Ranikhet disease before housing (1 week) and moreover local (deshi) chickens were dewormed at 2 weeks of age.

Challenge virus: Hemorrhagic bursae collected from a severe outbreak at Sylhet District of Bangladesh, homogenized and challenge inoculum was made following the method of Okoye & Adulugba (1996).

Experimental design: Four groups comprising 50 birds in each group were housed separately in four rooms and labeled as follows:

F-ch: Fayoumi-challenged F-c: Fayoumi-control
L-ch: Local-challenged L-c : Local - control.

Clinical and laboratory examinations: A mean of three birds were taken each time to find the bursal and body weight. Birds were visited every morning to note their clinical exhibition. Diagnosis of Gumboro disease was done following the characteristic necropsy (Lukert and Saif, 1991) and the serology with agar gel precipitation test was done as described by Faragher (1971).

Results and Discussion

Following the challenge earliest onset of morbidity was detected in the locals on day 1 post inoculation (p.i.) as drowsiness, ruffled feather, reluctant to move, inappetance and soiled vent but without mortality. On day 2 p.i. almost 100% birds in both the challenged groups (local and exotic) were found morbid with a start of a certain percentage of mortality also as soon as shown in (Table 2). Peak mortality observed on day 2 p.i. in locals but on day 3 p.i. in exotics.

Table 1: Variation of post-mortem lesions observed between the challenged breeds.

Post-mortem lesions	Fayoumi	Locals
Bursal enlargement	+	+
Hemorrhage at proventricular lining	+	+
Muscular petechiation	+	-
Spleen mottling	+	-
Hepatomegally	-	+
Kidney tubules distended with urates	+	+
Generalized body congestion	+	-

+ indicate present - indicate absent
Local means local variety available in Bangladesh.

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Table 2: Sex wise, fayoumi and local challenged birds (each, 50) mortality pattern

Days p.i	Fayoumi challenged				Local challenged			
	Males	Females	Total	% of mortality	Males	Females	Total No.	% of mortality
1	0	0	0	0	0	0	0	0
2	01	02	03	6	05	13	18	36
3	0	08	08	16	01	04	05	10
4	01	03	04	8	0	0	0	0
5	03	01	04	8	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
Total	06	14	19	38	06	17	23	46

p.i. post inoculation

Table 3: Mean bursal and body weight following days of challenge.

Day (p.i)	Mean bursal weight (gm)				Mean body weight (gm)			
	F-ch	F-c	L-ch	L-c	F-ch	F-c	L-ch	L-c
1	0.10	0.080	0.15	0.08	100	105	82	87
2	0.40	0.11	0.20	0.20	115	118	85	95
3	0.90	0.15	0.40	0.20	120	125	90	108
4	1.00	0.25	0.20	0.25	125	137	95	117
5	0.90	0.40	0.25	0.30	120	140	110	129
6	0.70	0.40	0.25	0.25	120	135	125	151
7	0.60	0.60	0.30	0.40	200	200	135	178
8	0.30	0.90	0.50	0.60	211	220	140	200

F-ch Fayoumi-challenge

F-c Fayoumi-control

L-ch Local-challenged

L-c Local-control

Total mortality was higher in locals than exotics (Table 2). Finding mortality in locals 46% and exotic 38% indicates the virulent field strain used in this study but more virulent pathotype of Gumboro disease virus was reported earlier to cause up to 70% mortality in the field (Van den Berg *et al.*, 1991).

Choice of three weeks of age for challenging was selected as the zero antibody titer observed by Agar Gel Precipitation Test (AGPT) (Siddique, 1999) at 19 days of age, moreover previous study by authors with the same Fayoumi breed observed that vaccination through ocular route at 18-28 days successfully controlled the Gumboro outbreak in Central Poultry Farm at Dhaka (Rahman *et al.*, 1996). International reports suggest with different breeds that the zero antibody titer observed in chicks at 29-31 days of age from dams vaccinated with live vaccine free from maternal antibody against Gumboro (Wyeth and Cullen, 1978). It is evident from Table 1 that in both the breeds bursal enlargement, hemorrhage lesions simulate the previous findings of other workers but contrasting features like peculiar hepatomegally and poor bursal enlargement in locals might be further whether any pre-infection is incriminated for this. There are reports that local and the adapted breeds were relatively more resistant to disease than the pullets as observed by Sudanese workers (Salman *et al.*, 1983). It has also been suggested that resistance to infectious diseases may be disease specific (Sharaf *et al.*, 1988). Subsequent studies dealt with Nigerian local chickens resulted reverse, as the locals were found more susceptible to Gumboro disease than the exotics (Okoye and Abulugba, 1996). Similarly, findings of the present study, where the Bangladeshi native local chickens were found more susceptible than an exotic breed like Fayoumi led the author to hypothesize that the effect of natural stresses like, changes in their usual rearing and feeding methods might have played an important role in increasing the susceptibility of the locals by degrading their resistance to disease. Experiments with other avian viruses suggest that

effects of natural stress like onset of sexual maturity are related to decreased host's resistance and allowing the re-shedding of virus like infectious Bronchitis of chickens (Bhattacharjee *et al.*, 1995). Further study is needed to carry out such type of study allowing usual habitat like free-range method of rearing and scavenging method of feeding. The authors also find it interesting that the bursal enlargement in the local chickens is less prominent (Table 3). So if opportunity allows, our future study would be concentrated at looking into the possible variation in between the local and exotic breeds regarding cell-mediated immunity (CMI) and humoral mediated immunity. Particular emphasis would be laid towards relating the T-cell immunity to genetics (breeds). It may be interesting to include sex as a parameter to disease resistance ability as increased mortality among the females than the males is revealed in present study (Table 2), and may be considered in our future study.

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