EPIDEMIOLOGICAL STUDY OF MAREKE'S DISEASE IN COMMERCIAL LAYER FLOCKS IN DISTRICT TOBA TEK SINGH

A.U. Haq, M. Siddique[1] and Z. Iqbal
Directorate of Poultry Research Institute, Rawalpindi, [1]Department of Microbiology, University of Agriculture, Faisalabad, Pakistan

ABSTRACT

A study was conducted to assess the prevalence and various risk indicators of Marek's disease (MD) in commercial layer flocks. A total of 207 layer flocks were studied around Gojra, district Toba Tek Singh from July 1998 to June 1999. Data were collected through cross-sectional epidemiological methods regarding their demography, management practices, prophylactic procedures and concurrent diseases. Prevalence attack rate of MD in this population was 20.77% (43/207). A mortality rate ranging from 5.40 to 11.60 per cent was recorded. The maximum prevalence was observed in birds of 13 to 30 weeks of age. Eleven out of 12 categorial variables had significant relationship with flock MD status. The most important risk factor of the disease was early exposure of immunosuppressive diseases like Gumboro, chicken infectious anaemia and coccidiosis, etc. ($P<0.01$). Other factors were non restricted movement of visitors ($P<0.01$), poor and un-isolated brooding of chickens ($P<0.01$), presence of farm animals and pet birds ($P<0.01$). It was also observed that the disease prevalence was quite high on farms owned by laymen in comparison with those managed by educated persons ($P<0.01$).

Key words: Marek's disease, Epidemiology, Prevalence, Layer.

INTRODUCTION

Marek's disease (MD) is the most common lymphoproliferative disease of chickens which is characterized by a mononuclear cell infiltration of peripheral nerves and less commonly and to a variable extent the gonads, iris, various visceral organs, muscles and skin. MD is caused by a Herpes virus, easily transmissible, and can be distinguished etiologically from other lymphoid neoplasms of the birds (Calnek and Witter, 1999).

Infection of chicken cells with three Marek's disease virus (MDV) serotypes interferes with expression of the major histocompatibility complex (MHC) class I glycoproteins. BF surface expression is blocked after infection of OU2 cells with MDV serotype 1, 2 and 3. MD virus down-regulates surface expression of MHC (B complex) class I (BF) glycoproteins during active but not latent infection of chicken cells (Hunt *et al.*, 2001).

Various environmental or stress factors have been reported to effect incidence of MD. The use of MD vaccine since 1970, has greatly reduced the occurrence of the disease but still it continues to cause problems in many countries. During 1977, U.S. workers started to collect various isolates of MDV from broiler flocks with high condemnation rate as well as from vaccinated adult breeder flocks experiencing vaccination failures. The outcome was the recognition of the so called very virulent (VV) strains of MDV against which Herpes virus of turkeys (HVI) vaccine provided poor protection. These strains belong to serotype I, alongwith almost all other disease producing strains of MDV that are most virulent, causing greater depression of body weight, higher mortality and more tumors in both genetically susceptible and resistant chickens (Payne, 1993). The present project was carried out to investigate the role of various risk factors associated with the prevalence of Marek's disease in district Toba Tek Singh, Punjab.

MATERIALS AND METHODS

From July 1998 to June 1999, two hundred and seven layer flocks with a population of 15,57,000 birds were studied around Gojra district Toba Tek Singh. A proforma was designed including questions about the factors which might influence the development and spread of Marek's disease. For consistency, the questions were grouped into four sections: demographic informations, management informations, prophylactic measures and the prevalent concurrent diseases.

Diagnosis was based on flock history, clinical signs and postmortem examination. Follow up visits when required were also undertaken on the adjacent farms. The visceral organs, peripheral nerves, skin, bursa of Fabricius and eyes were collected in 10% formalin after

detailed necropsy for confirmation through histopathology (Anjum, 1980).

The data thus obtained regarding various parameters were analyzed (Chi squared test) to see the attitude of the disease and effect of various risk factors on the prevalence of Marek's disease by calculating the odd's ratio of each factor according to the formula as described by Martine *et al.* (1997).

RESULTS AND DISCUSSION

A total of 207 layer flocks were investigated during the study period. The prevalence of Marek's disease (MD) among these farms was 20.77 percent (43/207). Among 2,53,00 birds on 43 affected farms, 21645 (8.54%) birds died showing mortality ranging from 5.40 to 11.60 percent. Maximum prevalence of MD was recorded in the birds of 13 to 30 weeks of age. Fadly (1997) reported that the disease is usually seen in chickens younger than 16 weeks of age but has also been diagnosed in laying breeder flocks while Heier and Jarp (2000) reported that MD is most common in layers between 16 to 32 weeks of age.

Clinical manifestations were different in various flocks and even the signs varied from bird to bird. In acute outbreaks, ataxia and subsequent unilateral or bilateral paralysis of extremities occurred. Many birds became dehydrated, emaciated and comatosed. In some birds, blindness was observed due to involvement of the iris. Clinical examination revealed the diffuse bluish fading to diffuse grayish opacity of the iris. In some birds a characteristic attitude was observed in which the

Table 1: Association of various factors with prevalence of Marek's disease

Risk Factors	MD Affected Flock	Flocks Free of MD	Odds Ratio	P Value
Early exposure to immunosuppressive diseases like IBD, CIA, coccidiosis etc.				
Yes	40	57	25.02	<0.001
No	3	107		
Chicken brooding status				
Poor & open	32	26	15.44	<0.001
Good & isolated	11	138		
Frequency of visitors				
Visitors allowed	36	49	12.06	<0.01
Visitors not allowed	7	115		
Presence of pet birds				
Present	31	29	10.57	<0.01
Absent	12	135		
Sanitary measures				
Poor disinfection	33	39	10.57	<0.01
Vigorous disinfection	10	125		
Presence of animals				
Present	35	52	9.42	<0.01
Absent	8	112		
Litter condition				
Poor & dusty	37	68	8.70	<0.001
Good	6	96		
Age group				
Multiple age	35	56	8.43	<0.001
Single age	8	108		
Access of wild birds				
Yes	38	88	6.56	0.00003
No	5	76		
Disease status of neighbouring farms				
Present	28	67	2.70	0.0± -0448
Absent	15	97		
Education				
Layman	28	75	2.21	0.02
Educated	15	89		
Feed used				
Commercial	19	87	0.70	0.7462
Home-mix	24	77		

birds stretched one leg forward and the other backwards. No specific signs such as diarrhoea, anemia and anorexia were observed. Similar clinical manifestations are also narrated by Calnek and Witter (1999).

Macroscopically the nerve lesions were the most common findings in the affected birds. Affected peripheral nerves were characterized by loss of striations, grey or yellow discoloration and sometimes with oedamatous appearance. These findings are in accordance with Payne and Biggs (1967). Lymphoid tumors were observed in one or more of the visceral organs. The gonads especially the ovaries were most commonly affected but lymphomatous lesions were also observed in lungs, heart, kidneys, liver, spleen, adrenal glands, pancreas, proventiculus, intestines, mesentery, iris, skeletal muscles and skin including comb. These findings are similar to those of reported by Fadly (1997).

Microscopically, MD lesions were characterized by heterogencity of neoplastic lymphoid cells. Large, medium and small lymphocytes as well as plasma cells were observed. The composition of tumors was the same histologically in various organs although the gross pattern of involvement was somewhat different. Sinnu *et al.* (1980) also reported similar findings.

Biosecurity plays an important role in the prevention and control of various infectious diseases. Eleven out of 12 categorical variables (Table 1) had significant relationship with flock MD status. The most important risk factor was early exposure to various diseases like Gumboro (IBD), chickens infectious anaemia (CIA) and coccidiosis etc. ($P<0.01$). The second risk factor for MD outbreak was associated with poor and unisolated brooding of chickens ($P<0.01$). The third important factor for the spread of MD was non-restricted movement of the visitors ($P<0.01$). The other important risk factors included presence of pet birds ($P<0.01$), sanitary measures, keeping of other animals on the farms ($P<0.01$), poor litter management, multiple age groups and access of wild birds such as crows, sparrows and pigeons etc. Most of the farmers throw dead birds open on various places such as agriculture crops, vegetable farms and canals etc., the majority of the farmers have not prepared proper disposal pits, thus allowing stray dogs and other animals to eat the dead birds and moving from farm to farm.

The other major relative risk factor for MD infection was poor litter and dusty conditions ($P<0.01$). MDV is readily transmitted horizontally to adjacent chickens either by direct contact or carried in dandruff particles (Calnek *et al.*, 1999). The major source of infection is the cell-free virus in the feather follicular epithelium. Use of vaccine can never be used as an excuse for poor management or lack of biosecurity measures but unfortunately the basic principles of disease control are not followed (Schat, 1997).

The disease prevalence was much higher (65%) on the farms owned by laymen while it was quite low (35%) on the farms managed by educated persons ($P<0.02$). In contrast to the above-mentioned factors, type of feed used had no correlation with the prevalence of MD.

Based on the findings of this investigation, following recommendations may be made to facilitate the control of MD:

i. Strict hygienic and biosecurity measures should be adopted such as the construction of disposal pits on the farms and restricted movement of the personnels from farm to farm.

ii. Single age group obtained from one parent flock should be reared on premises.

iii. Isolated proper brooding houses should be constructed.

iv. Vigorous disinfection of the house and its premises particularly before and during brooding period be carried out.

v. Various environmental stress factors should be minimized.

vi. High ammonia gas concentration and dusty environmental condition should be controlled.

vii. Farmer's education programmes may be initiated.

viii. Genetic resistant strains of chickens against MD should be developed.

REFERENCES

Anjum, A.D., 1980. Laboratory Manual for General Pathology. Qirtas, Faisalabad, pp: 19-62.

Calnek, B.W. and R.L. Witter, 1999. In: Diseases of Poultry. 10th Ed. The Iowa State University, Press Ames, Iowa, USA, pp: 325-360.

Fadly, A.M., 1997. The etiology and pathology of M.D. In: Special Marek supp. World Poultry International. Elsvier, The Netherlands, pp: 8-9.

Heier, B.T. and Jarp, 2000. Risk factors for Marek's disease and mortality in White LegHorns in Norway. Prev. Vet. Med., 28: 153-165.

Hunt, H.B, B. Lupiani. M.M.Miller, L. Gimeno LF. Lee and M.S. Parcells, 2001. MD virus down-regulates surface expression of MHC (B complex) class I (BF) glycoproteins during active but not latent infection of chicken cells. Virology, 30: 198-205.

Martin, S. W., A. H.Meek and P. Willeberg, 1997. Veterinary Epidemiology. Principles and Methods. The Iowa State University Press, Ames, Iowa, U.S.A.

Payne, L. N., 1993. Marek's Disease-Field experience and Vaccination strategies. Service Bull. Arbor Acres Farm, Inc. Glastonbury, Connecticut, USA.

Schat, K.A., 1997. What to do if there is a MD. Problem? In special Marek Supp. World Poultry International, Elsvier, The Netherlands, pp: 21-22.

Simu, G., H. Ciobanu and A. Cibanu-Bile., 1980. Histological aspects of lymphoid organs in chickens with Marek's Disease. Morphol. Embryol. (Bucur), 26 (4): 345-347.

Steel, R.G. and D. Torrie, 1980. Principles Procedures of Statistics. 4th Ed. McGraw Hill, Koga Kusha Ltd. Tokyo, Japan.