Observations on Gumboro disease (infectious bursal disease) in Pakistan

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Summary: An outbreak of Gumboro disease (infectious bursal disease) occurred among Fayoumi chickens at a Government poultry farm in Pakistan. There were typical gross and histopathological lesions, and the disease was reproduced experimentally in 3-week-old chicks by inoculating infected cloacal bursae collected from the outbreak. The humoral immune response to Pasteurella multocida bacterin was depressed in infected chickens. Isolation of virus and its antigenic characterisation are in progress.

KEYWORDS: Infectious bursal disease - Pakistan - Poultry diseases - Reoviridae - Viral diseases.

INTRODUCTION

Gumboro disease (infectious bursal disease) has been suspected of being present in Pakistan. Failure of protection by local and imported Newcastle disease vaccines (3) further strengthens the suspicion that Gumboro disease might be responsible for this immune failure. This report documents the presence of Gumboro disease in Pakistan.

THE OUTBREAK

An outbreak of disease was reported in 12-week-old Fayoumi chickens at the Government Poultry Farm, Peshawar, in January-February 1987. Although 70% of the birds were reported to be ill, the mortality rate was only 15%. The birds were dull, depressed, anorexic and had ruffled feathers. Diarrhoea was seen in a number of birds.

Post-mortem examination revealed haemorrhages in the breast and thigh muscles and in the cloacal bursa (bursa of Fabricius), which was either atrophied or enlarged. In some birds the bursa contained flakes of pus. Histologically the bursal lesions included haemorrhages, severe oedema and cyst formation in the centre of the follicles. Lymphoid follicles were either atrophied or contained necrotic cellular debris. Lymphocytes present in the follicles were degenerate. There was also proliferation of interfollicular fibrous tissue (Fig. 1).

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FIG. 1

Photomicrograph of bursal tissue showing proliferation of interfollicular connective tissue
Follicular lymphocytes have degenerated and have been replaced by heterophils and macrophages (70×)

EXPERIMENTAL TRANSMISSION

Day-old broiler chicks (Ross 1, an imported breed) obtained from a commercial poultry farm were reared in clean experimental sheds. The birds were provided a commercial chick starter and water. At three weeks of age, the chicks were randomly assigned to two groups of six birds each. Each bird in group I was inoculated intramuscularly with 0.5 ml of triturated bursae. Chickens in group II received 0.5 ml normal saline and served as controls.

The inoculum was prepared from infected bursae collected from the outbreak as previously described (4). Briefly, infected bursae were triturated with sterile sand in normal saline to make a 20% solution. Penicillin (1000 IU/ml) and streptomycin (10 µg/ml) were added to inhibit bacterial growth.

One bird from each group was slaughtered at 4, 8 and 11 days after inoculation while the remaining three birds from each group were slaughtered at 34 days. Gross lesions were recorded. Tissues from the cloacal bursa and spleen were fixed in 10% buffered formalin. Paraffin-embedded sections were cut and stained with haematoxylin and eosin.
In the bursa-inoculated group, the cloacal bursa became enlarged (2.5 times normal size) by the 4th day and atrophied by the 8th and 11th days. Atrophied bursae contained flakes of pus at 34 days. Haemorrhages were seen in breast and thigh muscles in the inoculated group. The spleen was friable on the 4th day, was enlarged on the 8th day and mottled with petechial haemorrhages on the 11th day. All birds in the control group appeared normal.

Chickens in the bursa-inoculated group had histological changes in the bursa on the 4th day that included partial depletion of lymphocytes and the presence of heterophils in the lymphoid follicles. On the 8th day the lymphoid follicles in the bursa were reduced in size. Lymphocytes in the follicles were replaced by necrotic tissue, heterophils and macrophages. The interfollicular tissue was slightly oedematous and hypercellular. On the 11th day the histological changes in the lymphoid follicles were more severe. Lymphoid follicles were nearly devoid of lymphocytes. There was cyst formation in the centre of many lymphoid follicles. Severe oedema and marked accumulation of heterophils was present in the interfollicular tissue. Proliferation of fibrous tissue was also seen. At 34 days the bursae had post-necrotic follicular atrophy. Only a few lymphocytes were seen around a mass of cellular debris in some follicles. Several small cysts were found in the medulla of follicles. Interfollicular tissue increased in size and occupied most of the volume of bursal tissue. Multiple foci of lymphoid necrosis were observed in the germinal centres of the spleen at 11 and 34 days.

**IMMUNOLOGICAL RESPONSE**

Following infection with bursal disease virus, chickens exhibit an impaired humoral immune response (2, 7). To confirm this effect, three birds in each group were vaccinated with *Pasteurella multocida* alum-precipitated bacterin 9 days after inoculation. A booster dose was given at 19 days. The passive haemagglutination test was performed in duplicate in microtitre plates using 1% human erythrocytes sensitised with a soluble antigen of *Pasteurella multocida*, as described previously (5).

A clear depression in antibody titre was seen in the bursa-inoculated group from the 5th day after the sensitising dose (Fig. 2).

**DISCUSSION**

Since the first outbreak of bursal disease in the USA (1), the disease has been reported from most poultry-raising countries. An outbreak of the clinical disease was observed among Fayoumi chickens at Peshawar, the epidemiological pattern and lesions being similar to those reported by others (2, 6, 8). It was confirmed by experimental reproduction and depression of the humoral immune response in infected chickens. We believe that this is the first documented evidence of the presence of bursal disease in Pakistan. Studies on the isolation of the virus, its antigenic characterisation and incidence of the disease are in progress.
FIG. 2

Antibody titre of *Pasteurella multocida* vaccine in bursa-inoculated and normal birds

Each point represents geometric mean titre of three birds. Arrows indicate the time of sensitising and booster dose of vaccine. O indicates normal birds; X indicates bursa-inoculated birds.

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OBSERVATIONS SUR LA MALADIE DE GUMBORO (BURSITE INFECTIEUSE) AU PAKISTAN. – K.N.M. Khan, S.A. Shah et M. Afzal.

Résumé : Un foyer de maladie de Gumboro (bursite infectieuse) s’est déclaré parmi des poulets Fayoum d’un élevage avicole gouvernemental au Pakistan. Les lésions macroscopiques et histologiques étaient typiques, et la maladie a pu être reproduite expérimentalement chez des poulets de trois semaines en leur inoculant des bourses de Fabricius infectées recueillies dans le foyer. On a observé chez les poulets infectés une dépression de la réponse immunitaire humorale à la bactérine de *Pasteurella multocida*. L’isolement du virus et l’étude de ses caractéristiques antigéniques sont en cours.

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Resumen: En una granja avícola gubernamental de Pakistán, se declaró un foco de la enfermedad de Gumboro (bursitis infecciosa) entre pollos Fayoumi. Las lesiones macroscópicas e histológicas eran típicas y la enfermedad pudo reproducirse experimentalmente en pollos de tres semanas inoculándoles bolsas cloacales infectadas recogidas en el foco. En los pollos infectados se observó una depresión de la respuesta inmunitaria humoral a la bacterina de Pasteurella multocida. El aislamiento del virus y el estudio de sus características antigénicas se encuentran en curso de realización.

PALABRAS CLAVE: Bursitis infecciosa - Enfermedades aviares - Enfermedades virales - Pakistán - Reoviridae.

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REFERENCES


