COMPARISM OF CELLULAR AND HUMORAL IMMUNE RESPONSES OF CHICKS TO *INFECTIOUS BURSAL DISEASE* VACCINATION.

Animoke, P. C.*, Ezeibe, M. C. O., Ngene, A. A***
**Department of Veterinary Medicine, University of Nigeria, Nsukka, Enugu State*
***Michael Okpara University, Umudike, Abia State*
paul.animoke@unn.edu.ng

ABSTRACT
To study the relationship between cellular immune response and humoral immune response of chicks to Infectious Bursal Disease (IBD) vaccination, four groups of chicks vaccinated with IBD vaccine were bled 3 weeks post vaccination (PV).Their whole blood samples were used for total and differential White Blood Cells (WBC) count to determine number of lymphocytes per ml of their blood, while their sera were used for Qauntitative Agar Gel Precipitation Test (QAGPT) to assess antibody titre. Least AGPT titre that gave zero mortality to IBDV challenge was also determined.
Correlation existed between humoral immune response with mean antibody (AGPT) titre, 9 ± 2.06 and cellular immune response with mean lymphocytes count (Per ml) ,216,500 ± 20,900 ($p < 0.05$). From AGPT titre 8 (about 200,000 lymphocytes per ml of blood) and above, there was zero mortality to IBDV challenge.

Key words: Humoral immunity, Cellular immunity, AGPT Antibody titre, IBD.

INTRODUCTION

Infectious Bursal Disease (IBD) is a very important economic problem in Nigeria (Akoma and Baba, 1975, Abdu et al, 2001)(I.W. Musa, L. Sai`du and E.S. Abalaka, 2012. Economic Impact of Recurrent Outbreaks of Gumboro Disease in a Commercial Poultry Farm in Kano, Nigeria. *Asian Journal of Poultry Science, 6: 152-159.*) and in most poultry producing countries of the world (Okoye, 1984). The disease is very contagious (Benton et al, 1967) and causes high mortality (Annon, 1977)(Islam, M.T and M. a. Samad, 2004. Mortaity in chicks associated with economic impact and prospect of layer chicks rearer package programme of the participatory livestock development project in Bangladesh. Int. J. Pout Sci, 3: 119 - 123). Infected chickens that do not die of IBD are often immunosupressed and so, die of secondary infections (Okoye and Aba – Adulugba, 1988)(Rev. sci. tech. Off. int. Epiz., 2000,19(2), 527-543 Infectious bursal disease (Gumboro disease) T.P.van den Berg, N. Eterradossi, D. Toquin & G. Meulemans). Control of IBD is very difficult because of antigenic variations of the causative virus (Mcferan et al, 1980, Aghakehan et al, 1996, Roji and Cerne, 1997). Most countries are now adopting different measures to improve control of IBD. In China, a mixture of yolk IgG and hyperimmune serum is used in prevention and treatment of IBD (Lin – Yusher et al,1997). Haddad et al (1997) reported that USA has used a combination of IBDV strain 2512 and bursal disease antibodies to produce IBDV – BDA complex vaccine which has proved protective even when chicks with maternal antibodies are vaccinated.
In Nigeria. main method of control for IBD is mass vaccination of chicks with live atenuated IBD virus vaccine. IBD often occurs in the country, at times, even among vaccinated flocks (Ezeokonkwo, 1997). A recent serosurvey of day old chicks hatched in Nigeria also showed they lacked maternal antibodies against IBD.There is therefore need for regular evaluation of immune response of vaccinated flocks, especially, parent stock hens.

Viral vaccines provoke immune responses to protect vaccinated animals (White,1984).Immune response is either humoral (mediated by antibodies) or cellular, through lymphocytes (Paul, 1989). Both cellular and humoral immune responses are specific to the invading antigen (Roitt,1994, Stites et al, 1994) and develope cuncurrently

(Janeway and Travers,1994). So, assessment of any of the two, may give indication of ability of vaccinated animals to resist infection by the antigen.

Serologic tests used to assay IBD antibody titres of avian species include Radioimmunoassay (RIA), Enzymeimmunoassay (EIA), PolyAcrylamide Gel Eletrophoresis (PAGE) and Agar Gel Precipitation Test (Roitt,1994, Stite, et al, 1994, Abbas et al, 1994, Herbert, 1994).

Some of these tests are sophisticated and expensive. Most farms and laboratories in developing countries can not afford them for routine assessmet of immune responses of vaccinated animals. Heamatology to determine lymphocyte count is simpler and cheaper. Agar Gel Precipitation Test (AGPT) is also a simple qauntitative serologic test (Herbert,1974).

It was therefore thought useful to compare AGPT titres of IBD vaccinated chicks with their cellular immune response (lymphocytes count) to see if differential lymphocyte count can give a good assessment of immunity against IBDV in vaccinated flocks.

MATERIALS AND METHODS

Four groups, each of 10 chicks vaccinated at 10 days of life were bled 3 days post vaccination. Part of each blood sample was used for differential lymphocytes count while the remaining portion was allowed to clott for serum used for Qauntitative Agar Gel Precipitation Test as described by Herbert (1974). The mean lyphocytes count and mean AGPT titre were compared by correlation co – efficient.

In a second experiment, 6 groups, each of 10 chicks, were vaccinated with IBD vaccine on their tenth day of life.Conditions, such as, medication with multivitamins before and after the vaccination, day of bleeding post vaccination and administration of booster vaccination were varried for the groups in order to get different immune levels in the different groups of chicks.A sevent group was not vaccinated and served as control. Blood was collected from each group for serum before they were challenged with one drop (I/O) of a virulent IBD virus (NVRI, Vom, Nigeria) per chick.

The sera were used for QAGPT to determine antibody titre for each group while the chicks were observed for clinical signs and for mortality.

RESULTS

There was correlation between mean AGPT tire (9 ± 2.06) and 216,500 ± 20,900 per ml got as mean lymphocytes count ($P < 0.05$).

The AGPT titres and lymphocyte counts are as on table 1.

Mortality was 100% for a group with AGPT titre zero, 80% for a group with titre 1 and 70% when titre was 2. Groups with AGPT titres of 8, 16, $\geq$ 32 and another $\geq$ 32 had zero mortality each.

Table 1: AGPT titres and Lymphocyte counts of chicks vaccinated with IBD vaccine.

AGPT Titre	Lymphocyte Count(Per ml).
8	212,000
4	168,000
16	270,000
8	216,000

AGPT Titre of chicks vaccinated with IBD vaccine was directly related to their lymphocyte count ($P < 0.05$).

DISCUSSION

The association of humoral immune response (AGPT antibody titre) and cellular immune response (lymphocyte count) seen in this experiment is in agreement with reports of Roilf (1991) and Stites et al (1994) that when an antigen enters a host, the host`s Antigen Presenting Cells (APC) diggest the antigen and present its peptides to the host`s T – cell receptors so that the body produces both cellular and humoral immune responses specific to the antigen. Humoral and cell mediated immunity develope cuncurrently (Janeway and Travers, 1994).

Most laboratories in Nigeria and in other countries in the tropics where IBD causes more mortality (Annon, 1977) run differential WBC count routinely. So, it may be easy to educate poultry farmers especially those who keep parent stocks to check immune responses of their flocks after IBD vaccination by assessing number of lymphocytes per ml of blood of vaccinated chickens.

Since least protective antibody titre was AGPT 8 and from result of the first experiment, two groups with AGPT 8 gave lymphocytes of 212,000 and 216,000 per ml of blood, lymphocyte counts of 200,000 and above may protect chicks against IBDV challenge.

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