IMMUNE RESPONSE OF CHICKS TO ORAL VACCINATION WITH COMBINED EXTRA- AND INTRACELLULAR FOWL POX VIRUSES

S. S. SAINI, N. K. MAHATI and S. N. SHARMA

Department of Veterinary Bacteriology and Virology, Punjab Agricultural University, Ludhiana, India

SUMMARY

The immune response of chicks to oral vaccination with HP1-strain of fowl pox virus was studied using intracellular virus alone or a combination of intra and extracellular viruses. The first and second vaccinations were done at four days and 25 days of age, respectively. In both groups the birds showed 50% protection against challenge virus at 32 days of age while no immunity was recorded at 95 days of age. The serum IgG concentration in both the vaccinated groups was comparable and it was significantly higher (P < 0.05) than the control birds one week after revaccination. The serum haemolytic complement activity in both the vaccinated groups was significantly lower (P < 0.05) than the control birds.

INTRODUCTION

Routine vaccination against fowl pox is done by skin scarification. This method is costly, time consuming and involves handling individual birds. But with increasing numbers of poultry flocks mass vaccination procedures are preferred. It has also been reported that extracellular fowl pox virus is a better immunogen than intracellular virus (Fernandes, Sharma and Tanwani, 1981). The present study was, therefore, undertaken to observe the immune response of chicks given intracellular virus alone or a combination of intracellular and extracellular viruses of the HP1-strain of fowl pox virus by the oral route.

MATERIALS AND METHODS

The HP1-vaccine strain of fowl pox virus was obtained from West Germany through the courtesy of Prof. Dr A. Mayer. The challenge strain isolated from a field outbreak of fowl pox was available in the Department of Veterinary Bacteriology and Virology of the College of Veterinary Science, Ludhiana. The HP1-strain was grown on dropped chorio-allantoic membrane (CAM) of 12-day old chick embryos. The infected CAM suspension served as intracellular virus and infected allantoic fluid was used as extracellular virus.

Vaccine and challenge viruses were titrated on dropped CAM of 12-day old chicken embryos. Intracellular virus was used at a dose rate of $10^{8.5}$ EID$_{50}$ per bird while combined vaccination was done using $10^{4.5}$ EID$_{50}$ of each type of virus per bird.

One-day old White Leghorn male chicks were obtained from Punjab Agricultural University Hatchery, Ludhiana. They were divided into three groups and were reared separately in three different rooms (Table I). Group I was vaccinated with intracellular virus alone while group II was vaccinated with the combination of intracellular and extracellular viruses. Group III were kept as unvaccinated controls.

The chicks were vaccinated at four and 25 days of age, respectively. One day before each vaccination the chicks were deprived of water for five hours and then
SAINI, MAITI AND SHARMA

**Table I**

*Serum IgG concentration in vaccinated and control birds*

<table>
<thead>
<tr>
<th>Groups (vaccine)</th>
<th>Serum IgG concentration (mg/ml) at different days of age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4\a 11 18 25\b 32 39 46 53 60 67 95</td>
</tr>
<tr>
<td>I (Intracellular)</td>
<td>6.5 6.40 6.30 6.63 6.76* 6.93 6.86 6.20 6.40 6.93 6.10</td>
</tr>
<tr>
<td></td>
<td>±0.20 ±0.20 ±0.36 ±0.14 ±0.06 ±0.36 ±0.17 ±0.26 ±0.23 ±0.47</td>
</tr>
<tr>
<td></td>
<td>±0.05 ±0.31 ±0.16 ±0.20 ±0.16 ±0.16 ±0.31 ±0.17 ±0.26 ±0.20</td>
</tr>
<tr>
<td>III (Nil)</td>
<td>6.5 6.38 6.20 5.63 4.90 5.93 5.90 5.26 5.73 6.20 6.20</td>
</tr>
<tr>
<td></td>
<td>±0.03 ±0.17 ±0.14 ±0.10 ±0.31 ±0.00 ±0.24 ±0.16 ±0.17</td>
</tr>
</tbody>
</table>

\a Age at first vaccination.
\b Age at second vaccination.
\* Significantly higher than control at P < 0.05.

a measured quantity of water was offered to them for one hour. The remaining quantity of water was again measured. The average water intake per bird before first and second vaccination was found to be 5 ml and 12 ml, respectively. During vaccination, the vaccines at the required doses were added to a measured quantity of water (25°C) which was consumed by the chicks within one hour.

Birds were bled (three to four per group) at different intervals after vaccination and the serum pooled separately for each group.

Chicken IgG was purified by sodium sulphate precipitation followed by DEAE-cellulose (Whatman DE-52) chromatography technique (Williams and Chase, 1967). Anti-chicken IgG was raised in a sheep by giving three intradermal injections each of 10 mg of IgG preparation mixed with equal volume of Freund’s complete adjuvant (Difco) at weekly interval.

Weekly serum IgG levels in different groups were measured by the single radial diffusion test using the method of Mancini, Carbonara and Heremans (1965) and measurement of the serum haemolytic complement activity (method described by Skeeles, Likert and Debuysscher, 1979) was followed.

The immune status of vaccinated birds was studied by challenging four birds each time with field strain of fowl pox virus using 10^5.4 EID_{50} per bird by the feather follicle method at 32 and 95 days of age. The challenge reactions were graded according to Woodward and Tudor (1972).

**RESULTS**

Vaccinated birds did not show any respiratory distress or secondary pox lesions. The serum IgG level of different groups at various intervals is given in Table I. The serum IgG level in both the vaccinated groups (I and II) was comparable to each other and was significantly higher (P < 0.05) than the control birds only one week after revaccination. In group II there was a significant rise in serum IgG level in comparison to group III at 32 and 53 days of age.