Vet.Med.J.,Giza. Vol.46, No.4B. (1998) 877-882.

VACCINATION OF PIGEONS WITH LA SOTA NEWCASTLE DISEASE VACCINE AGAINST PIGEON PARAMYXOVIRUS SEROTYPE-1

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SUMMARY

Forty pigeon proved to be free from antibodies against paramyxovirus-1 (PPMV-1) by haemagglutination inhibition (HI) test were vaccinated with LaSota Newcastle Disease (ND) vaccine. The vaccination comprised of two doses with 4 weeks interval. This gave an antibody response of 8 log 2 using HI. The birds were challenged with unusual virulent Saudi PPMV-1 via intramuscular (i. m) or by contact. In the light of clinical observation, immune response and virus excretion results, the vaccine gave a high level of protection against the challenging virus.

Key words: Unusual pigeon PMV-1; Vaccination of pigeon with ND vaccine

INTRODUCTION

The pigeon paramyxovirus serotype-1 (PPMV-1) is a member of the avian paramyxovirus serotype-1 group, (Alexander et al., 1985). It caused great economical losses in pigeons throughout Europe, North Africa, the Middle East and elsewhere (Alexander et al., 1985). The virus showed high specificity for pigeons (Columba livia).

In Saudi Arabia, the disease was reported in the early nineties (Al-Afaleq et al., 1993; Abu-Elzein et al., 1993). Though the Saudi isolate of PPMV-1 was classified as a member of the pigeon paramyxavirus-1 group (P), still it showed some variation from that group, in that it was more related to the classical Ulster 2C Newcastle disease (ND) virus, using monoclonal antibodies (Mabs), (Alexander & Ruth Manvell - Personal Communication), In the light of this close relationship, the present experiments aimed to examine the degree of protection which could be offered by the classical ND vaccine, used in Saudi Arabia, against the Saudi PPMV-1.

MATERIAL AND METHODS

The challenging virus (PPMV-1)

The Saudi PPMV-1 isolate which caused the earlier outbreak (AL-Afaleq et al., 1993; Abu Elzein et al., 1993) was used as the challenging virus. It was passaged twice in pigeons free from PPMV-1 antibodies giving 100% morbidity rate.

The Newcastle disease vaccine

This was supplied by the Ministry of Agriculture & Water, Riyadh. It contained La Sota Newcastle vaccine strain used for chickens in this country.

The PPMV-1 hyperimmune serum

This was produced in rabbits against the SAU/ET 1/92, PPMV-1 isolate as described by Hanson (1975). Its haemagglutination inhibition (HI) titre was 1/128.

The experimental pigeons

Fifty-five adult locally-bred pigeons (Columba livia) proved to be free from the PPMV-1 antibodies using the HI methods (Hanson, 1975), were used in the present experiments. The pigeons were divided into three groups. Group "A" comprised 10 birds which were used as controls. Group "B" consisted of forty birds which received the vaccine as described below. Group "C" comprised 5 pigeons which were used as a source of infection in the contact experiment. Each group was fully separated from the other. The birds received food and water add lib.

Vaccination

Each of Group "B" pigeons received 0.25 ml containing 10^9 EIDso per 0.2 ml nasal route. Four weeks later they received a second dose of the same vaccine given intraocularly (0.1 ml/bird).

The birds were kept under close observation. Blood was collected weekly and sera were separated and used for HI test. Cloacal swabs for virus isolation were collected daily following vaccination. The virus isolation was performed in 9 day-old specific pathogen free (SDF) chicken embryos (SPAFAF laboratories, CT, USA) via the allantoic sac as described by Hanson (1975). Eggs were incubated at 37°C and those dying within 24 hours post inoculation were discarded. Subsequently eggs containing dead embryos were collected and kept for 3 hours at 4°C before the alllantoic fluid was collected, and subjected to HI test using known ND antisera for viral indentification.

Challenge

This was prosecuted at the 8th week post vaccination. Two challenging procedures were followed. The vaccinated pigeons were divided into two groups (B1 and B2). Group B1 was challenged by contact and Group B2 by intramuscular (i.m) inoculation. The procedures were as follows:

Contact challenge

Five PPMV-1 antibody free pigeons were inoculated i. m. with the virulent PPMV-1. at a titre of 10^7 EID50 per 0.1 ml allantoic fluid diluted in normal soline to these were introduced 20 vaccinated and 5 control pigeons. The birds were provided with food and water add lib. and observed for four weeks. Serum samples were

weekly collected from each bird. Cloacal swabs were collected daily.

Challenge by i. m. inoculation

Each of 20 vaccinated and 5 control pigeons received 0.25 ml of the virulent PPMV-1 virus i. m. containing 10^7 egg infectious dose 50 (DID50) per 0.1ml of egg allantoic fluid, diluted in normal saline. Experience, in our laboratory, with this virus showed that when it was given i. m. it killed all pigeons within 4-7 days (Al-Mulhim & Abu Elzein-unpublished data).

Challenged pigeons were observed daily for 4 weeks. Serum samples were weekly collected; and cloacal swabs were collected daily.

RESULTS

Sero conversion

The HI antibody titres of the sera collected from vaccinated and non-vaccinated pigeons are shown in Fig. 1 The booster vaccine dose gave an antibody response which reached a titre of 8 log2 on the sixth well. This titre dropped to 7 log2 by weeks 7 and 8.

Protection results

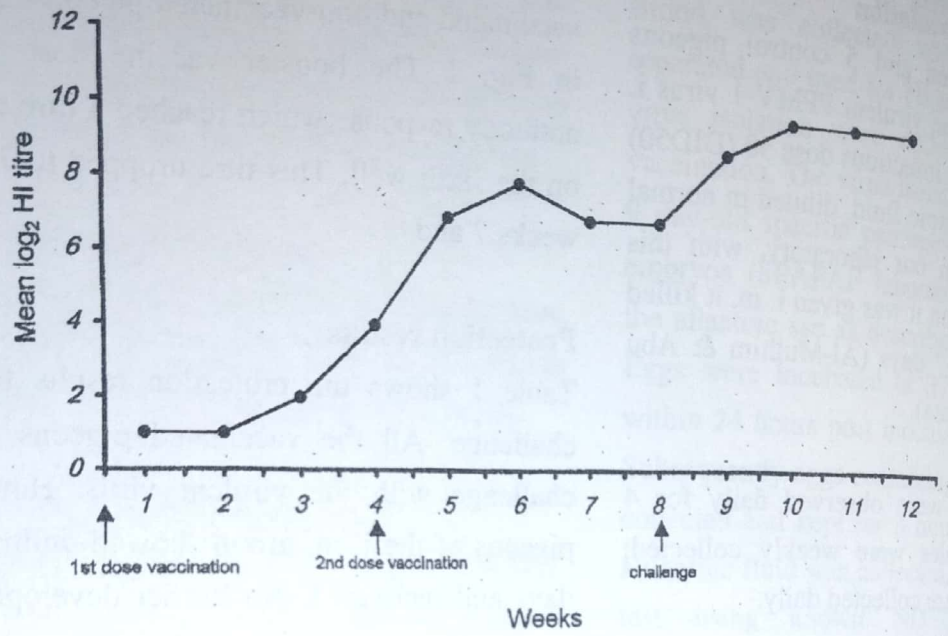
Table 1 shows the protection results following challenge. All the vaccinated pigeons survived challenge with the virulent virus. However, 5 pigeons of the i. m. group showed dullness for 3 days and recovered, No further developments of

Table 1: Clinical response of pigeons vaccinated with la Sota NP vaccine and challenged with

Method of challenge	Clinical signs	Dead	Virus isolation following challenge		Clinical signs
			No. of positive pigeons	Days post inoculation	
I/M group: vaccinated	*5/20	0/20	11/20	5	Dullness for 3 days
Controls	5/5	5/5	5/5	Till died in 5 days	Anorexia, diarrhoea, nervous signs and death
Contact group: vaccinated	0/20	0/20	9/20	11	No signs
Controls	5/5	5/5	5/5	Till died in 11	Anorexia, diarrhoea, nervous signs and death

*= Number of positive/total.

Fig. 1. The immune response of pigeons following vaccination and challenge.



the disease were seen. Both groups of control pigeons and the 5 pigeons which were used as a source of infection for the contact challenge showed typical signs of disease. Thus manifested dullness, ruffled feathers. anorexia, diarrhoea, nodding, shaking, torticollis and death, within 5 days for the i. m. group and 11 days for the contact group.

Virus excretion

Following challenge, the virus was exreted by all control pigeons until death occurred as a result of the disease. Of the i. m. challenged vaccinated pigeons 55% excreted virus (for 5 days following challenge) while 45% of the contact-challenged vaccinated pigeons excreated virus (for 11 days post challenge).

DISCUSSION

The present experiments were designed to examine the efficiency of the ND vaccine, currently used in chickens in Saudi Arabia for protection of pigeons against the virulent PPMV-1.

These experiments were inspired by the fact that the PPMV-1 field isolate which caused great losses in fancy pigeons in Saudi Arabia (Al-Afaleq et al., 1993; Abu Elzein et al., 1993) was found to be closely related to the ND virus, as examined by the monoclonal antibodies at Weybridge Labs., U. K. (Alexander & Ruth Manvell-personal communication).

The types of ND vaccines used in chickens in Saudi Arabia are, the Hitchner B1, La Sota, and inactivated oil vaccines. The choice of the La Sota for the god protection in pigeons (Alexander et al., 1986) and that inactivate oilemulsion vaccines are not well tolerated by racing pigeons and that reactivation of herpesvirus 1, which is latently present in most pigeons may take place. Also chlamydia psittaci may be activated (Wallis 1984; VVindevogel & Duchatel 1985; Kaleta et al., 1986).

The results in the present study indicated that 88% of the vaccinated pigeons developed good immunity against the challenging virus; and that 12 % showed dullness for 3 days and recovered. None of the challenged vaccinated pigeons died; while all the control ones succumbed to the disease and died.

Though the primary vaccinal dose did not produce high HI titres in the pigeons (a maximum of 4 log 2 by the fourth week), the second dose resulted in high HI titres that reached 10 log2 by the tenth week following vaccination and so leveled until the twelveth wekk post vaccination.

From the fore-going it is clear that two doses of the live La Sota vaccine (four weeks apart) protected all the vaccinated pigeons against the challenging PPMV-1.

The literature showed different results when different ND vaccines were used for the protection of pigeons against the PPMV-1 (P-group). For instance, Vieene et al., (1984) found some protection when they used La Sota live vaccine. Again, Cernik et al., (1983) showed that some protection was given by the La Sota live vaccine when it was given intranassly but not when given in drinking water.

The high protection level obtained in the present experiments could be attributed to the more relatedness of our challenging PPMV-1 to the classical ND virus (Alexander & Ruth Manvell - personal communication).

ACKNOWLEDGEMENTS

I would like to thank Dr. Alexander and Madam Ruth Manvell, Weybridge Labs., U. K. for classification of the PPMV-1, Prof. E. M. E. AbuElzein for reading the manuscript and Mr. A. A.-Khars for excellent technical assistance.

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