دراسة مقارنة عن رد الفعل المناعي للدجاج الحصن
بلغ نتائج الدراسات المختلفة بطريقة الحقن في الفئران

مصطفى بظايمي، محمد عمار، أحمد حموه

تم دراسة رد الفعل المناعي لخمس لقاحات ضد مرض الليفيكاس، وهي لقاح
الهتشنر، واللامستوزا والهتشنر ب، مع هيدروكسيد الألومنيوم والكوماروف ولقاح
النيفيكاس، التي حقنها جميعها في مجتمع من كتاكين التسمين عمر 21 يوماً
والتي سبق تحصينها بلقاح الهتشنر ب، بالتقطير بالعين عند اليوم السابع من العمر.

وقد استخلص من النتائج أن مقارنة اللقاحات عند حقنها عضلاً قياسية
بمستوى الأجسام المناعية المائعة لتلازيم في الدم وكذلك نسبة النضج عند إجراء
اختبار التحدي بواسطة عطرة ضارية من فيروس الليفيكاس كانت بالترتيب الآتي:

* عطرة الهتشنر - ثم عطرة ليفيكاس الميت - ثم عطرة الهتشنر ب
مع هيدروكسيد الألومنيوم وعطرة اللامستوزا وأخيرا عطرة الكوماروف.
COMPARATIVE STUDY ON THE IMMUNE RESPONSE OF CHICKENS VACCINATED INTRAMUSCULARLY WITH DIFFERENT NEWCASTLE DISEASE VACCINES
(With One Table)

By
M.A. BASTAMI, M.M. AMER and A.S. HAMOUDA
(Received at 25/2/1986)

SUMMARY

In a comparative study on five different types of Newcastle disease (ND) vaccines (Hitchner, B1; La sota, Aluminium hydroxide (AH) adsorbant Hitchner B1 strain, Komarov and inactivated vaccine injected intramuscularly in to 21 day old broiler chicks, which were previously vaccinated with Hitchner B1, ocularly at the age of 7 days. This study revealed that for intramuscular route of vaccination the most suitable vaccine is Hitchner B1 followed by oil adjuvant inactivated, AH-adsorbed Hitchner B1 then La Sota and finally the local komarov vaccine.

INTRODUCTION

Newcastle disease had been recognised for the first time by DOYLE (1927) in England, while DAUBNEY and MANSI (1947) had reported the enzootic of the disease in Egypt and thus poses a serious threat to the development of the poultry industry.

A variety of vaccines were therefore used in an attempt to control the disease, but it become evident that the most widely used methods of vaccination are drinking water, eye drop and spray with B1, and La Sota types of vaccines, did not always give adequate protection against the virulent local disease virus.

The intramuscular (i.m) route of vaccination with lentogenic vaccines had been reported by ASPLIN (1952), MAZZARACCHIO and ORFEL (1956), NILAKANTAN et al. (1960) Rizk and CHU (1973) where "F" strain was used. Hitchner B1 live vaccine was used for i.m vaccination of chickens by NILAKANTAN et al. (1960). La Sota vaccinal virus was used as i.m vaccine by BANKOWSKI (1974), VECTEN and LAARHOVEN (1975) as well as SAAD and BASTAMI (1982).

Alluminium hydroxide (AH) adsorbant living ND vaccinal strains were intramuscularly used by NAKAMURA et al. (1956), SEMERDJIEV (1962) and NEDELCEIN et al. (1963).

The usage of komarov (K) attenuated i.m vaccine had been reported for immunization of chickens against ND by ZUGDAM (1953), EL-NASSERI (1958), NILAKANTAN et al. (1960), EL-SISI (1966), AHMED et al. (1967), ACURIA (1975) and RIZK and CHU (1973).

Inactivated oil adjuvant ND vaccine was used for vaccination of chicken's MITCHOLL and WALKEN (1953), HOFSTAD (1953 & 1968), JACOTO and VALLEE (1962), KEEBLE and COID (1962), HOFSTAD and YODER (1966), GOXDON (1971), LEVEY and ZAKAY-RONES (1973),

BOX and FURMING (1975) and EIDSON (1981).

This work was planned to evaluate the protective efficacy of different ND vaccines used intramuscularly against ND by both Hemagglutination inhibition (HI) and challenge tests as comparative criteria.

**MATERIAL and METHODS**

- **Embryonated chicken eggs:** Commercial fertile chicken eggs were used in this experiment.

- **Experimental chicks:** Two hundreds and ten Cross breed Hubbard chicks as one day old chicks were used.

- **Vaccinal strain viruses:** ND Hitchner B (TAD, Lot. no. 209/1) with $10^{8.92}$ EID$_{50}$/vial 1000 doses was used for both ocular and i.m injection. La Sota vaccine (TAD, Lot. no. 575) containing $10^{8.51}$ EID$_{50}$/vial 1000 doses, Aluminium hydroxide adsorbed living Hitchner B$_2$ (TAD, Lomavac, Lot. no. 297/ L) Containing $10^{9.23}$/vial 1000 doses komarov attenuated vaccine (Anim. Res. Inst., Abassia, Cairo, lot No. 8717) with $10^{7.92}$/vial 1000 doses as well as inactivated oil adjuvant vaccine (Rhone Merieux, Lot No. 40U191) were used for i.m vaccination of experimental chicks. The doses for i.m injection were adjusted to contain $10^{6}$ EID$_{50}$ for each.

- **Challenge virus:** A velogenic viscerotropic ND virus local strain identified by SHEBLE and REDA (1976) was used.

- **Determination of virus infectivity:** Titration of the used living vaccines and challenge virus before use was carried out according to ANON (1971), while the EID$_{50}$ was calculated according to REED and MUENCH (1938).

- **Hemagglutination inhibition (HI) test:** The B-procedures of the HI test was employed using the micromethodology according to TAKATSY (1956) and the titres were given titre reference numbers (TRN) according to KALETA and SEIQMANN (1971).

**Challenge test:** A challenge dose of $10^6$ EID$_{50}$ per bird was intramuscularly injected. The challenged birds were daily observed for symptoms and/or specific mortalities for 3 weeks. Birds with symptoms and survived till the end of the observation period were considered as if dead.

- **Statistical analysis:** Analysis of the obtained data was performed according to SNEDECOR (1956).
NEWCASTLE DISEASE VACCINES

EXPERIMENTAL DESIGN

Two hundred and ten one day Hubbard chicks were used. At the age of one week, 30 chicks were randomly collected and left as non-vaccinated negative control (Group 1); while the rest of the birds (180) were vaccinated with Hitchner B\textsubscript{1} vaccine via the ocular instillation. At the 3rd week of life 30 chicks were left as Hitchner vaccinated control (Group 2) and the remaining birds (150) were then divided into 5 equal groups; consists of 30 birds each (Group 3-7); and subjected to i.m vaccination as follows:

- **Group 3**, injected with Hitchner B\textsubscript{1} vaccine.
- **Group 4**, injected with La Sota vaccine.
- **Group 5**, injected with AH-adsorbed Hitchner B\textsubscript{1} living vaccine.
- **Group 6**, injected with Komarov vaccine.
- **Group 7**, injected with inactivated oil adjuvant vaccine.

Fifteen random blood samples were collected from each group at 1, 2, 3, 4, 5, 6 and 7 weeks of age for serum collection. These sera were subjected to HI-test for determination of HI-antibody titres. At the 7th week of age (4 weeks after i.m vaccination) chickens of all groups were challenged and kept under observation for 3 weeks. The obtained results are shown in Table (1).

RESULTS

Results in table (1) are showing that:

a) HI-antibody titres:

- Nonvaccinated control group (1) showed undetected titres at the 3rd week of life and still negative up to the age of challenge.

- Hitchner B\textsubscript{1} vaccinated control group (2) showed the highest titre at the 4th week of age (3.00) followed by deresing titres to be 1.07 at the 7th week.

- Birds injected with Hitchner B\textsubscript{1} (Gr.3) and inactivated Vaccine (Gr. 7) showed increasing HI-titres to reach the level of 3.46 and 5.20 at the 7th week; respectively.

- La Sota (Gr. 4) and AH-adsorbed Hitchner B\textsubscript{1} (Gr. 5) injected birds showed the highest titre 3.73 and 3.86 at the 6th week of life (3rd post-injection) and decreased to 3.47 and 3.46; respectively at the 7th week.

- Birds of group 6, those received komarov vaccine showed the highest titre 3.53 at the 5th week then decreased to 2.00 at the 7th week of age.

- Comparing the HI-results obtained from the injected groups (3-7) birds vaccinated with inactivated oil vaccine showed the highest titres followed by those vaccinated with AH-adsorbed Hitchner B\textsubscript{1}, La Sota, Komarov and finally Hitchner B\textsubscript{1} vaccine.

b) Protection rate:

The protection rate against the challenge virus was the highest (86.67) in group 3 (vaccinated i.m with Hichner B\textsubscript{1}) followed by 83.33 in group 7 (vaccinated with oil adjuvant), 73.33 in group 5 (vaccinated i.m with AH-adsorbed), 63.33 in group 4 (that vaccinated with La Sota) and 60 in group 6 (vaccinated with the i.m komarov). moreover, the Hitchner B\textsubscript{1} eye drop vaccinated control (Gr. 2) showed 46.67% protection and the nonvaccinated control

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(Gr. 1) showed Zero per cent protection.

Statistical analysis of the challenge test results proved that group 2 is significantly decrease than those of groups 3, 5 and 7 (P/ 0.05), and groups 4 and 6 are significantly decrease than those of group 3 and 7 at P / 0.05.

DISCUSSION

In Egypt, it is well known that ND is highly epidemic and causes a serious losses among poultry. Also the individual methods of vaccination (eye drop and injection) are the most suitable methods to face this epidemic ALLLAN et al. (1973) and RIZK and CHU (1973). So our study was carried out to detect the most effective ND vaccine it is Lm administered.

Results of HI-test showed the HI-titres in sera of birds Lm vaccinated with lentogenic strains (Hitchner B1, La Sota and AH-adsorped B1 vaccine) are higher than those in vaccinated with Lm komarov,1 these results disagree with those reported by MAZZARACJOP and ORFEI (1956), NILAKANTAN et al. (1960) and ALLAN et al. (1973). Oil adjuvent vaccinated birds showed highest and persisstant HL-level this finding is similiar to those reported by ALLAN et al. (1973), CERSI and NARDELLI (1974) and BOX and FUNMINGER (1975). Birds vaccinated with AH-adsorped vaccine (Gr. 5) showed slightly higher HI-antibodies than those injected with Hitchner B1 vaccine only, this does not completely agree with results of SOMERDJEV (1962) who found that birds vaccinated with AH-adsorped komarov resulted in HI-titres 0.4 times higher; 14 days after injection, than those injected with komarov vaccine alone.

The challenge test showed that the injection of lentogenic vaccines resulted in higher protection rates, 86.47, 73.33 and 63.33 in group 3, 5 and 4; respectively; than the komarov vaccinated (60%) these results agree with those reported by SAAD and BASTAMI (1982) who reported that La Sota Lm vaccine showed higher protective rate than the komarov, and disagree with those reported by NILAKANTAN et al. (1960) and ALLAN et al. (1973). The 83.33% protection obtained in group 7 vaccinated with inactivated oil vaccine is so far similiar to those reported by HOFESTAD and YODER (1966) who repourt 86% protection rate, while our result is higher than those reported by LOMBARDI and COAVO (1976) who reported 60% protection rate in birds with HI-titres 5.12. Protection rate of birds vaccinated with AH-adsorped vaccine (Gr. 5) is lower than those vaccinated with vaccine without aluminium hydroxide (Gr. 3), this can be supported with those reported by PALATKA and TOOTH (1966) who mentioned that immunogenicity of B1 strain with AH was lower than that of B1 strain in saline.

From the present investigation it can be concluded that for intramuscular route of vaccination the most suitable vaccine is Hitchner B1 followed by oil adjuvent, Aluminium hydroxide adsorped live vaccine, La Sota and finally the fosal komarov.
NEWCASTLE DISEASE VACCINES

REFERENCES


Asplin, F.D. (1955): Immunization against Newcastle disease a virus of low virulence (Strain F) and observation on subclinical infection in poultry resistant fowls. Vet. Rec. 64, 245.


Voeten, A.C., Larchoven, P.Y.M., Van (1975): Immunization against Newcastle disease by intramuscular injection of La Sota strain vaccine, a field trial, tijdschrift Voor Biergenneeskunde 100 (6) 88.
## Table 1

Results of hemagglutination inhibition and challenge test of birds intramuscularly vaccinated with different Newcastle disease vaccinas

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<tr>
<th>Gr. No.</th>
<th>Vaccine</th>
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