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العلاقة بين فيتامين E واصابة كتاكيت " هجرو "
بفيروس مرض النيوكاسل (N D V)

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أجرى الباحثون دراسة على العلاقة بين فيتامين E والاصابة بفيروس مرض النيوكاسل . ولقد أثبتت الدراسة أن كلا من الأعراض الاكلينيكية والمناعية المكتسبة لاتتأثران بمستوى التوكوفيرول الموجود في مصل الطيور ، الا أنه كان واضحا أن الاصابة بالفيروس يصحبها انخفاض في مستوى التوكوفيرول في المصل .

وقد اختير هذا المرض نظرا لانه أحد الامراض الشائعة في الكتاكيت في جمهورية مصر العربية .

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**RELATION BETWEEN VITAMIN E AND NEWCASTLE
DISEASE VIRUS INFECTION (NDV) OF HUBBARD CHICKS**
(With 3 Tables)

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SUMMARY

The relationship between vitamin E and Newcastle disease (ND) was studied. The results revealed that the clinical and immunological status of ND were not affected by the tocopherol serum level of the host. Yet, it appeared that, ND depressed the tocopherol level in the serum. This disease was selected since it is the commonest disease affecting chickens in Egypt.

INTRODUCTION

Deficiency of vitamin E in the ration of chickens was found to be associated with the syndromes known as nutritional encephalomalacia, exudative diathesis and muscular dystrophy (PAPPENHEIMER and GOETTSCHE, 1931). Hence TITUS (1951) as well as SINGSEN *et al.* (1953) emphasized on the importance of a certain level of vitamin E in the ration for growing chickens to prevent encephalomalacia. Moreover, HARRIS and MASON, (1956) reported that, there are other stress factors that induce or accelerate the usual signs of vitamin E deficiency.

With respect to its effect on microbial infections MOHADI *et al.*, (1963) mentioned that vitamin E has no protective effect in chickens. Yet concerning viral diseases, HANAN (1950) cited that alpha-tocopherol esters protect chick embryos against infection by small doses of influenza virus. Later on CHEVILLE and MONLUX (1966) studied the relation between vitamin E deficiency and avian encephalomyelitis virus, while SAADAT and AFNAN (1970), investigated the same relationship with avian leucosis virus.

Concerning the influence of vitamin E on the immune system of the chickens, TENDERDY and NOCKELS (1975) reported that vitamin E increased the protection of chickens immunized against *E.coli* infection.

The same applies for SHAFFY and SCHULTZ (1979), who mentioned that excess vitamin E and selenium had immunostimulatory effects in various species of animal and birds, while deficiency of vitamin E and selenium suppressed the immune response.

Thus the purpose of the present work is to find out the possible relationship between vitamin E in chickens and infection with NDV as being the most common nervous disease in Egypt, having a special significance in poultry industry.

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A.A. BASHOUNI, *et al.***MATERIAL and METHODS****Materials :**

1 - **Virus** : The locally isolated velogenic viscerotropic Newcastle disease virus (NDV) was supplied by the Vaccine Institute, Ministry of Agriculture, Abbassia, Cairo. It has a titre of $10^{8.0}$ ELD/50 per ml. when titrated in 9 days old embryonated chicken eggs.

2- **Chicks** : One day old Hubbard chicks, non vaccinated against NDV were supplied by the General Poultry Company (GPC).

3- **Rations** : Standard commercial chicken ration was freshly supplied by the (GPC).

4- **Vitamin E** : It was supplied by Pfizer company in liquid form. E- Viton ampoules (dl- α -Tocopheryl acetate), Kahira Pharm. Co.

Methods :

1- **Blood samples** : Blood samples were collected from chickens by heart puncture according to MCKIE and McCARTNY (1960).

2- **Haemagglutination inhibition test (HI)** : It was carried out according to ANON (1971).

3- **Estimation of vitamin E** : According to QUAIFF *et al.* (1939).

Experimental study :

Eighty chicks of one day old were reared for four weeks during which they were fed the standard balanced commercial ration containing the nutritional requirement of vitamin E. Moreover, additional amounts of vitamin E were supplied in drinking water at rate of 300 IU daily per litre/100 chickens. At 4 weeks of age, the chickens were subdivided into two subgroups A and B of forty chickens each. Group A was given the same previous nutritional requirements till the end of experiment. On the other hand, group B was given FeCl₃ treated commercial ration without any further addition of vitamin E. The ration for both groups was weekly assayed for vitamin E content before being given to birds.

At eight weeks old, blood samples were collected from each bird separately. Each serum sample was subdivided into two parts, one part for vitamin E assay, while the other for HI test. Furthermore, both group A and B were subdivided into equal subdivisions of 10 birds each.

Three subdivisions from group A and B were inoculated with various dilutions of NDV. Each bird received intramuscularly half millilitre of the respective dilution. The fourth subdivision in each group was left as a control. Birds were kept under observation for a period of 4 weeks. Dead birds were autopsied, and lesions and symptoms were recorded. Birds showing ND infection were bled and vitamin E content in their sera were estimated. Surviving birds were bled at 14, 21 and 28 days post-virus inoculation and the HI test done on their sera.

RESULTS**1- Vitamin E content in ration :**

Table (1) presents the vitamin E content of FeCl₃ treated and non treated ration expressed in mg/kg.

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2- Level of a-tocopherol in chicken sera :

The level of a-tocopherol in sera of chicken pre-and post virus inoculation is shown in table (2).

DISCUSSION

The relationship between the presence of vitamin E deficiency and the course of Newcastle disease, a common nervous affection of chickens in Egypt was studied.

Results as presented in table (2) demonstrate that prior to virus inoculation, group (A) had tocopherol level about 4 times that of group (B). Once again after inoculation of Newcastle disease virus (NDV) group (A) had levels equaling twice that of group (B), but both levels were below those pre-virus inoculation. Moreover, the course of ND was not affected by alpha-tocopherol level in the serum of the host and alpha tocopherol level in sera had no definite effect on the response of the host. Table (3) gives the mean HI titres of both groups before inoculation which were 9 and 7 for group (A) and (B) respectively. Looking to the immune response in both groups, one finds that there was a high rise in HI titres for both groups after 15 days irrespective of the inoculated virus dilution. The titres continued to increase after 21 days then become constant after 28 days with only a negligible rise. After 21 days, the increase in titre was more pronounced in group (A) than in group (B) being four times for the first versus twice for the second. In addition, chickens inoculated with the concentrated virus (-5) had the highest increase in titres being five times those for the same hosts after 15 days. With respect to the incubation period and symptoms, one could not find any difference between the two main groups (A) and (B). TENGARDY and NOCKELS (1973), reported that vitamin E did not play a direct role in the immune response of chickens. Yet, LOW (1976) mentioned that supplemented vitamin E gave double titre of HI for chickens vaccinated with LaSota strain of ND vaccine. Although NDV depressed alpha tocopherol level post virus inoculation, yet it seems that this effect was non specific effect, since SAADAT *et al.* (1970) found that plasma tocopherol level in leucosis infected chickens was lower than in healthy one.

So one can conclude from these results that vitamin E deficiency in chickens had no definite effect on the clinical or immunological status of NDV infection.

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TABLE (1)

Vitamin E content of Fecl₃ treated and non treated rations as mg/kg.

| Type of ration | Range | Mean \pm SE |
|-------------------------------------|-----------|------------------|
| Without Fecl ₃ treatment | 15.2-29.7 | 20.4 \pm 1.46 |
| With Fecl ₃ treatment | 3.3-6.1 | 4.45 \pm 0.363 |

TABLE (2)

The percentage of a-tocopherol level of 8 weeks old chickens per- and post inoculation with ND virus.

| Time of a-tocopherol estimation | mg% of serum a-tocopherol | | | |
|---------------------------------|---------------------------|---------------|---------|---------------|
| | Group A | | Group B | |
| | Range | Mean \pm SE | Range | Mean \pm SE |
| pre- virus inoculation | 0.860 | 1.152 \pm | 0.254 | 0.357 \pm |
| | 1.810 | 0.065 | 0.508 | 0.018 |
| post virus inoculation | 0.561 | 0.709 \pm | 0.265 | 0.328 \pm |
| | 0.882 | 0.037 | 0.414 | 0.015 |

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TABLE (3)

Response of susceptible chickens to inoculation with different dilutions of virulent NDV.

| Group | Virus dilution | Incubation period in days | Symptoms and P.M. lesions | Death ratio | Mean HI titre pre-inoculation | Mean HI titre post inoculation | |
|-------|------------------|---------------------------|---------------------------|-------------|-------------------------------|--------------------------------|---------|
| | | | | | | 15 days 21 days | 28 days |
| A | 10 ⁻⁷ | 7 - 12 | + | 6/10 | | 130 | 320 |
| | 10 ⁻⁶ | 7 - 12 | + | 3/10 | 9 | 96 | 448 |
| | 10 ⁻⁵ | 6 - 8 | + | 5/10 | | 125 | 587 |
| | 10 ⁻⁷ | 7 - 8 | + | 4/10 | | 146 | 366 |
| | 10 ⁻⁶ | 6 - 10 | + | 6/10 | 7 | 160 | 333 |
| | 10 ⁻⁵ | 4 | + | 3/10 | | 160 | 320 |
| | | | | | | | 332 |

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