



RELATIONSHIP BETWEEN FISH OIL AND IMMUNE RESPONSE OF PIGEONS VACCINATED AGAINST NEWCASTLE DISEASE

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ABSTRACT

Infectious diseases are one of the main factors constraining the birds sector. In Iraq, pigeons are facing various diseases such as Newcastle disease (ND). Therefore, the experiment was carried out at the animal house, college of veterinary medicine/ university of Kufa to find the effect of fish oil on the immune response and antibody production against ND in pigeons daily oral administrated fish oil. Thirty male pigeons (Zigil breed) were randomly divided into two equally treated groups as the following: T1/ birds without fish oil supplementation (as a control group) while T2/ birds were supplemented daily with 1 ml fish oil orally during the experimental period (30 days). Blood samples were collected at three times (0, 15 and 30 days respectively) during the experimental period. Serum total protein, albumin, globulin and antibody titer against ND were measured. The results indicate that fish oil have a significant enhance of immune response and antibody production against ND while there is no significant differences in serum total protein, albumin, and globulin. In conclusion, oral administration of fish oil during breeding period of pigeons may be improve antibody production against Newcastle disease and some of blood biochemical traits and finally improve health status.

KEYWORDS: Pigeons, Omega-3, Newcastle disease, Antibody titer, Total proteins.

INTRODUCTION

Newcastle Disease is one of the most serious epidemic diseases in a wide variety of birds (Alexander, 2003). It always leads to considerable bird death and economic losses (Homhuan and prakongpan, 2007). It is epizootic in most countries, where it continues to cause serious losses despite the vaccination of industrialized poultry (Aldous and Alexander, 2001). Birds vaccines are widely applied to prevent and control contagious diseases (Muhammad and AL-Mayah, 2013). The availability of standard sensitive serological test adapted to the condition in these countries would facilitate diagnosis and accurate monitoring of vaccination programs. Vaccines and vaccination programs vary widely depending on several local factors (e.g. Type of production, level of Biosecurity, local pattern of disease, status of maternal immunity, vaccines available, costs and potential losses) (Marangon and Busani, 2006). On the other hand, food components are playing an important role in preventing diseases by modulating physiological systems (Dentali, 2002). Fish oil is a good source of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) which are called omega-3 fatty acids (n-3) (Stulnig, 2003). In fact, consumption of omega-3 is associated with reducing the risk of cardiovascular diseases, and cancers (Mozaffarian *et al.*, 2005; Theodoratou *et al.*, 2007). In veterinary medicine there was a wide range of studies and researches on omega-3. Jameel and Sahib (2014); Jameel *et al.* (2015) who found that supplementation of omega-3 can play an important role in improving blood traits, immunity against ND, and health status of the broilers. Thus, this study was designed to identify the effect of daily oral administer of

fish oil on blood total protein, albumin, globulin and antibody titer against Newcastle disease.

MATERIALS & METHODS

This experiment was carried out at College of Veterinary Medicine/ University of Kufa during the period from 26, Oct. to 26, Nov. (2014). Thirty pigeons (Zigil breed) adult were bought from a local marketing and divided randomly and equally into two treated groups (15 birds in each treated group) as follows: The first group (T1) was without fish oil and kept as a control group and the second group (T2) was oral administration 1 ml/omega-3/bird daily. Feed and water were provided *ad libitum*. All birds were vaccinated against ND (Lasota strain) at the first day of the experiment by eye drop. At time 0, 15 and 30 days of the experiment, blood samples from all birds were collected from the bronchial vein in a test tube without anticoagulant. The blood was allowed to clot and centrifuged for 10 minutes at 3000 rpm to obtain on serum which stored in a deep freeze (-20C°) (Al-Daraji *et al.*, 2008). Total protein, albumin, globulin concentration and antibody titer against ND were laboratory analyzed by using of diagnostic kit, then spectrophotometer and enzyme-linked immunosorbent assays (ELISA). Data generated from the research were carried out in a complete randomized design (Steel and Torrie, 1980). These data were subjected to ANOVA according to the general linear model procedure of SAS (2001). The significant differences among means were determined by L.S.D by p 0.05 level of significance.

RESULTS & DISCUSSION**Blood total protein, albumin and globulin**

The means of serum total protein, albumin and globulin for pigeons daily supplemented of fish oil are presented in

Table (1, 2, 3). All parameters at time 0, 15 and 30 days showed no significant difference in T2 (fish oil) as compared with T1 (control group). The causes may be related to the pigeons were adults.

TABLE 1: serum total protein (g/l). Mean \pm Standard error

Treatment \ Time	Zero (Day)	After 15 (Days)	After 30 (Days)
T1 (Control)	37.16 \pm 1.16 a	37.33 \pm 1.92 a	38 \pm 2.22 a
T2 (Fish oil)	37 \pm 1.39 a	38.16 \pm 2.02 a	38.66 \pm 2.41 a

Small similar letters in the same column denoted that no significant differences between treatments at a level ($p < 0.05$).

TABLE 2: serum albumin (g/l). Mean \pm Standard error

Treatment \ Time	Zero (Day)	After 15 (Days)	After 30 (Days)
T1 (Control)	13.33 \pm 1.25 a	13.50 \pm 1.38 a	14.33 \pm 1.99 a
T2 (Fish oil)	13.66 \pm 1.14 a	14.16 \pm 1.40 a	14.66 \pm 1.72 a

Small similar letters in the same column denoted that no significant differences between treatments at a level ($p < 0.05$).

TABLE 3: serum globulin (g/l). Mean \pm Standard error

Treatment \ Time	Zero (Day)	After 15 (Days)	After 30 (Days)
T1 (Control)	23.83 \pm 1.81 a	23.83 \pm 1.95 a	23.66 \pm 1.20 a
T2 (Fish oil)	23.33 \pm 1.74 a	24 \pm 2.30 a	24 \pm 3.52 a

Small similar letters in the same column denoted that no significant differences between treatments at a level ($p < 0.05$).

Antibody titer against ND

The effect of daily supplementing fish oil on antibody titer against ND at time 0, 15 and 30 days is presented in Table (4) that refers to at time 0 no significant difference were found in T2 (fish oil) as compared with T1 (control group). But, at time 15 and 30 days, a significant ($p < 0.05$) increase of immunity were found in T2 (fish oil) which recorded (2208.80) and (1973.80) respectively as compared with T1 (control group). The increment may be due to increase dietary omega-3 (α -linolenic acid) inhibited the conversion of omega-6 (linoleic acid) to long chain omega-6 fatty acids in immune tissues (Korever and Klasing, 1997). Also, competition between linoleic acid and α -linolenic acid in conversion to long-chain fatty acids and eicosanoids in immune tissues most likely contributed

to improve antibody production in response to vaccines (Wang *et al.*, 2002; Puthongsiriporn and Scheideler, 2005). Omega-3 (fish oil) which considered to be a substrate for the generation of prostaglandin and leukotriene, the two substances were known immunomodulators, fish oil also has the capacity to modulate cytokine production by lymphocyte and signal transduction in immune cell population (Tobarek *et al.*, 2002; AL-Mayah, 2009). On the other hand, omega-3 may help on absorption of vitamin E in the ration (Barroeta, 2007). The present results agree with Jameel (2013), Jameel *et al.*, (2015) who found that a good relationship between administration omega-3 by feed of broilers or within *ovo* injection of fertile eggs with antibody titer against ND.

TABLE 4: serum antibody titer against ND. Mean \pm Standard error

Treatment \ Time	Zero (Day)	After 15 (Days)	After 30 (Days)
T1 (Control)	1283.80 \pm 139.46 a	1740.60 \pm 97.30 b	1560.40 \pm 92.70 b
T2 (Fish oil)	1394 \pm 116.95 a	2208.80 \pm 161.12 a	1973.80 \pm 151.12 a

Small similar letters in the same column denoted that significant differences between treatments at a level ($p < 0.05$).

CONCLUSION

Fish oil has no significant effect on serum total protein, albumin and globulin, while the immune response against ND was improved significantly ($p < 0.05$) after 15 and 30 days from administration of omega-3.

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