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Evaluation Of Total Proteins And Hematological Parameters In Newcastle Disease Vaccinated And Oregano Treated Groups In Erbil

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Abstract

Background and Purpose: Despite the fact that Newcastle disease is commonly vaccinated poultry. Key biochemical indicators and differential blood were observed following vaccination with the La Sota strain of the Newcastle disease virus, that is extensively used in hens, and oregano treatment to examine the impact of vaccination and oregano treatment on the health of chickens. Materials and Methods: 390 adult chickens were used in the study, which were separated into five study groups and a control group. Chicks in the study groups were vaccinated via eye drop and subcutaneous techniques, and oregano was administered via drinking water. Blood samples were taken before and after the vaccination on days 40. The total erythrocyte count, hemoglobin concentrations, hematocrit levels, and total and differential leukocyte counts were all measured. Serum total albumins and globulins were tested. Results: Total serum proteins were increased within physiological limits in all groups, with an albumin globulin ratio that suggested antibody production stimulation. The number of erythrocytes, hemoglobin concentration, and hematocrit were not substantially different in any of the groups. Conclusion: There were no negative health consequences as a result of the findings. As a result, the vaccine and oregano treatment that are already commonly used in hens can be safely utilized in chickens.

Keywords: hematological parameters, Newcastle disease, oregano

Introduction

The avian paramyxovirus causes Newcastle disease (ND), which affects a variety of chicken species (Verwoerd, 2000). Newcastle disease is communicable and infectious disease that is wreaking havoc on our broiler flocks. The first outbreaks of Newcastle disease (ND) in chicken were discovered in Java, Indonesia, in 1926. (Capua, et al., 2002). Following that, the disease spread to numerous places around the world, particularly Asian countries. Many ND outbreaks have been documented in Iraq, in various geographic areas and at various times of the year. Broilers among all ages are exposed to this infection, and the severity of infection was shown in unvaccinated broilers, mixed infections, poor management, and a poor feeding system. In addition, the mortality rate in chicken rearing results in large losses.

Despite the efforts made around the world to eradicate the disease, breakouts continue to be a prevalent occurrence (Fair, et al., 1999). All poultry in Iraq has been required to be vaccinated against ND using the La Sota lentogenic strain of the virus from the year 2000. Chickens have been effectively protected by vaccination. The commonly used La Sota vaccination has been shown to be safe for hens. Because of the significant differences in body size and immune system characteristics between chickens and humans (Brzek and Konarzewski, 2007, Green and Blue-Mclendon, 1999).

Oregano is a plant that belongs to the Labiatae family and is found all across the Mediterranean (Zheng, et al., 2009). Carvacrol and thymol are the main components of oregano (Ahmadifar, et al., 2020, Tan, et al., 2015). When given to animal diets, oregano antimicrobial, antifungal, antioxidant (Ahmadifar, et al., 2020), antibacterial, anti-inflammatory, anthelminthic, pro-digestive, and growth stimulating qualities, according to research (Ferreira, et al., 2016). It also helps animals develop faster by lowering feeding costs, preventing disease, and increasing growth performance (Ahmad, et al., 2009). The number of studies on the use of oregano in diet of monogastric animals such as chickens is growing every day (Heluy, et al., 2020). Oregano supplemention increased growth performance (Mohammadi, et al., 2020), growth performance and muscle growth in animals (Carneiro, et al., 2021), hepato-renal functions and catalase and superoxide dismutase activities in common animals (Abdel-Latif, et al., 2020), liver antioxidant system, and hepatocyte protection (Rafieepour, et al., 2019). As a result, measurements of several parameters such as total proteins and hematological constituents revealed valuable information regarding animal health. Hematological markers, according to Espirito (Espirito, et al., 2018), show the animal's physiological sensitivity to its internal and external surroundings.

The goal of this study is to compare total proteins and hematological parameters in Newcastle disease vaccine recipients with oregano treatment recipients.

Materials and methods:

1- **Oregano:** is a liquid solution manufactured by Olebiotec company/France. It is a phytogenic feed addition and optimize the microbiotic brain connection
2- **Animals:** Three hundred ninety (308 Rose chickens) day old were hatchery in Erbil. The chickens were housed together in six experimental boxes 65 chickens for each box, located in Sydan Private poultry farm in Erbil. During April – May 2021.
3- **Experimental Design:** Groups consist of sex replicate in each replicate 65 Rose 308 chicks, ND la Sota attenuated vaccine (when using 4HAu antigen titer 1/64 to 1/128) and inactivated ND vaccine from (Pasco Co. Iran) against ND was used through Eye drop routes for four groups and two groups left as control: **Group A** (ND la Sota): vaccinated in (eye drop) on 5 days, 15 days, 28-day old adding Origano in drinking water one day post vaccination. **Group B** (ND la Sota)**:** vaccinated in (eye drop) only on 5 days, 15 days, 28-dayold. **Group C** (inactivated ND vaccine): vaccinated at 5 day old via S/c injection adding Origano in drinking water one day post vaccination. **Group D** (inactivated ND vaccine): vaccinated at 5 day old via S/c injection only. **Group E** (Non vaccinated): as control group**. Group F** (Non vaccinated and adding Origano in drinking water only): as

control group. Dietary and environmental conditions were identical in each six groups. They were placed in separate boxes provided with litter in the form of (wood shaving). The chicks were supplied with basal scientific diet for commercial broiler chickens.

4- **Blood collection:** Blood samples were obtained from 10% of each group's chickens at the age 40 days for hematology examination. It must be noted that for obtaining blood samples from jugular vein. Blood samples was collected from chickens of different ages, were allowed to clot at room temperature then centrifuged at 2500 rpm for 15 minutes, and then the sera were collected, labeled and transported immediately to the laboratory for further analysis. Serum samples were analyzed d for determination the total serum protein concentration.
5- **Hematological analysis**: This analysis of hematology to revealed the count erythrocytes and hemoglobin (Hb) concentration were measured. Hematocrit was obtained after capillary centrifugation.
6- **Statistical Analysis:** The Statistical Analysis System- SAS (SAS, 2012) program was used to detect the effect of difference factors in study parameters. Least significant difference – LSD test (Analysis of Variation-ANOVA) was used to significant compare between means in this study.

Results:

1- **Results of total protein (Albumin and Globulin) in vaccinated and treated groups:** Total serum protein concentration increased in all groups, and this increase was statistically significant. The globulin fraction increased as well, although this change was non-significant in all groups vaccinated and oregano treated. The rest of serum proteins were treated as albumin, and the albumin to globulin ratio was calculated for the groups with significant albumin decrease and non-significant globulin increase. This ratio increased after vaccination, showing that globulins had an even higher impact on the total protein increase than albumins. This was expected, supposing that the increase is due to the gamma-globulin fraction representing the antibodies formed in response to the vaccine virus. Other serum proteins remained within the physiological range, thus indicating a healthy status of the vaccinated and treated birds (Table 1).

2- **Table 1: Comparison between difference groups in Total Protein, Albumin and Globulin**

Group	Mean ± SE		
	Total Protein(g/dl)	Albumin(g/dl)	Globulin (g/dl)
Control	2.82 ±0.10 b	1.02 ±0.03 bc	1.80 ±0.12
Oregano	3.33 ±0.33 ab	1.17 ±0.08 bc	2.16 ±0.24
Live vaccine	2.89 ±0.41 b	0.980 ±0.12 c	1.91 ±0.29
Inactive vaccine	3.74 ±0.06 a	1.47 ±0.07 a	2.26 ±0.04
Live vaccine +oregano	3.28 ±0.19 ab	1.21 ±0.04 bc	2.07 ±0.16
Inactive vaccine +oregano	3.51 ±0.20 ab	1.23 ±0.08 ab	2.28 ±0.15
LSD value	0.772 *	0.246 *	0.584 NS
Means having with the different letters in same column differed significantly. * (P≤0.05).			

Results of hematological parameters in in vaccinated and treated groups: Values for erythrocyte count, hemoglobin concentration and hematocrit showed no statistically

significant change throughout the experiment, and they remained within their physiological limits. This indicates that no adverse reaction to vaccination and treatment with oregano which would affect the said parameters had taken place (Table 2).

Table 2: Comparison between difference groups in Hematology parameters

Parameters	Mean ± SE						LSD value
	Live vaccine	Live vaccine+ oregano	Oregano	Nactive vaccine+ oregano	inactive vaccine	Control	
HGB(gl)	132.70 ±23.66	110.72 ±3.93	124.72 ±3.11	119.05 ±3.49	125.22 ±9.06	113.65 ±9.43	33.63 NS
RBC(10^12/l)	31.57 ±4.59	30.31 ±3.28	30.24 ±2.92	28.82 ±3.47	28.14 ±3.72	21.54 ±1.75	10.11 NS
HCT%	226.65 ±42.85	222.67 ±34.63	224.75 ±32.80	203.47 ±29.06	215.15 ±40.02	140.82 ±13.35	99.56 NS
MCV(FL)	70.35 ±4.37	72.62 ±4.05	73.32 ±3.50	70.12 ±1.76	74.95 ±4.95	65.20 ±1.08	10.62 NS
MCH(pg)	4.37 ±0.81	3.72 ±0.42	4.20 ±0.40	4.20 ±0.37	4.60 ±0.52	5.25 ±0.22	1.62 NS
MCHC(g/l)	64.00 ±14.26 ab	52.50 ±7.53 b	58.50 ±7.96 ab	60.50 ±6.23 ab	62.75 ±10.18 ab	80.50 ±4.50 a	26.75 *
RDWSD(fl)	101.50 ±15.31	92.25 ±17.41	91.75 ±15.64	81.50 ±8.06	94.25 ±15.93	71.00 ±2.97	40.42 NS
RDWCV%	35.47 ±3.52	31.15 ±4.06	30.72 ±3.70	28.90 ±2.31	30.80 ±3.04	27.15 ±0.74	9.21 NS
PLT(10^9/L)	2235.00 ±349.12 a	1514.50 ±2321.30 b	1594.00 ±147.32 ab	1576.75 ±133.15 b	1549.50 ±156.21 b	1417.00 ±233.68 b	657.52 *
PCT%	3.53 ±0.54 a	2.33 ±0.36 b	2.42 ±0.29 b	2.18 ±0.24 b	2.31 ±0.16 b	1.95 ±0.34 b	1.03 *
MPV(fl)	15.87 ±0.69	15.30 ±0.98	15.12 ±0.81	13.72 ±0.32	15.07 ±1.05	13.62 ±0.25	2.73 NS
PDW(fl)	25.72 ±1.13	26.05 ±2.08	26.05 ±1.37	26.20 ±0.27	24.67 ±1.62	26.45 ±0.47	3.92 NS
PLCR%	68.82 ±5.62	63.92 ±7.75	62.80 ±6.29	52.50 ±2.62	63.32 ±8.30	51.17 ±2.28	17.68 NS
Means having with the different letters in same row differed significantly. * (P≤0.05).							

Discussion

The number of erythrocytes, hemoglobin concentration, and hematocrit readings did not change considerably during the course of the investigation, and they were all within the physiological range for an ostrich of that age (Campbell, 1995, Palomeque, et al., 1991 and

Fudge, 1996). This study revealed that the stress produced by the treatment of experimental animals, which included vaccination count. Increased total protein and albumin percentages may suggest that the body has successfully fought off a disease (Campbell, 1995). Otherwise, the results were within Levy's (Palomeque, et al., 1991 and Fudge, 1996), Fudge's (Fudge, 1996), and Green's (Fudge, 1996) physiological ranges (Green, 1999). Total protein % did not vary considerably in any of the experimental groups over the course of the investigation.

Although the role of globulin in immunological reactions stimulates the generation of antibodies, the percentage of antibodies in the peripheral blood does not vary considerably (Campbell, 1995) after the administration of lentogenic vaccines. During the first three days of infection, only specific pathogenic viruses and bacteria that cause significant inflammation can be generated (Levy, et al., 1989). The erythrocyte values in our experiment were consistent with those published by Green (Green, 1999), which was predicted given the lentogenic vaccination we utilized. All groups, including the control, showed an increase in total serum proteins. Throughout the experiment, the increase was statistically significant, although it stayed within physiological limits (Spinu, et al., 1999).

This discrepancy could be explained by the fact that the birds were given extra food (oregano) due to the season in which the experiment was done. The relative proportion of albumin to globulin fraction was, however, more intriguing. In the groups vaccinated via drinking water, the change in this was statistically significant. The albumin fraction grew at a pace that almost equal to the total protein growth in these groups, but the globulin fraction increased even more (25-27). After vaccination, the albumin to globulin ratio fell, which can be a sign of antibody generation. Although globulin fractionation was not performed, the parallel investigation that measured the titer of specific antibodies against the ND virus confirmed that attributing their moderate increase to immune response (28-32).

Conclusion

Finally, we find that immunizing and treating hens against Newcastle disease with a la Sota vaccine, inactivated ND virus, and oregano had no negative impact on the birds' health because Key hematological and biochemical blood parameters stayed within physiological limits. The expected response to immune system activation is an increase in total proteins and albumin fraction proportion, while the non-significant change in the globulin count can be attributed to experiment-induced stress. Oregano has been shown to improve chicken survival and growth, and it may have the capacity to increase the surface area required for digestion by lengthening intestinal villi.

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