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Original Research

Effect of adding different levels of olive leaf powder to the diet on the production performance and some physiological characteristics of broilers

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ABSTRACT:

An experiment was conducted to investigate the effect of adding different levels of Olive Leaf Powder (OLP) to the diet on production performance and some physiological characteristics of broilers. This experiment carried out in one of the private poultry breeding fields in the Hit city of Anbar province and lasted for seven weeks (49 days) from 18th of September 2014 to the 2nd of November 2014. One hundred ninety two unsexed one day -old broilers (Ross 308) were reared with an average mean weight of 42.3 g. The chicks were distributed into four treatments with three replicates per treatment and 16 chicks per replicate. The experimental treatments involved T_1 (control), T_2, T_3, T_4 which were supplemental with basal diet in the levels of 5, 10, 15 g/kg of the Olive Leaf Powder (OLP) respectively. The results of this study showed that T_2, T_3 were significantly higher (P<0.01) compared with T_1 in the body weight at week seven. As for the feed conversion coefficient, T_2 had a significant superiority (P<0.05) on T_1 and T_4 at week six. Also, T_2 was significantly higher (P<0.05) compared with T_1 and T_4 at week seven in the relative growth rate. At week seven, the feed consumption was significantly higher (P<0.01) in T_2 and T_3 compared to T_1. Regarding to the effect of the addition of OLP on some blood characteristics, T_3 and T_4 were significantly increased (P<0.01) in the size of the blood cells and the level of hemoglobin compared to T_1 and T_2. For the total protein concentration, the lowest level was recorded in T_1 while T_3 was significantly higher (P<0.01) compared with T_1, T_2, and T_4. The addition of OLP showed a significant decrease (P<0.01) in the concentration of glucose, cholesterol and triglycerides in serum compared to T_1 and the lowest level was noted in T_4. A significant decrease in the level of LDL (P<0.01) and high levels of high density lipoproteins (HDL) for the addition of OLP compared to control treatment. Moreover, a significant difference in the concentration of enzymes Aspartate Amino Transferase (AST) and Alanine Amino Transferase (ALT) which carries the amine group in the blood serum of the broilers. A significant decrease (P<0.01) in the concentration of AST and ALT in T_2, T_3, T_4 compared with T_1 was detected.

Keywords:

Olive leaf powder, Broilers, Production performance.

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INTRODUCTION

The medicinal plant has a special and significant position in the agricultural world and animal production because it contains natural chemicals of great interest and importance in its physiological influence and therapeutic activity. One of these plants was the leaf of olive plants. The olive leaves contain a high level of complex phenolic compounds known as oleuropein, which is a glycosides (1- 18% in the olive leaves) considered as an antioxidant and included oleanic acid and hydroxythyrosol. Olive leafs contain a high percentage of active substances of great importance in their physiological effect and therapeutic activity, including lingstroside, verascascide, hydroxytyrosol, oleanolic acid, maslinic acid, luteolin, arginine, olivine-di-glucosid and olivine. The chemical composition of the olive leaves contains several active ingredients, including oleanolic acid, oleine, oleasterol, oleuropein, olivine, olestranol, glutamate, proline, serine, mannite, and aspartate. Olive leaves have different biological functions as antioxidants, sugar inhibitors, blood pressure reducer and anti-effectiveness of microbes disease, where it prevents growth, especially bacteria and widespread fungi and the extract of olive leaves considered a source of antiviral agents, where it is confirmed that the extract of olive leaves containing the compound oleuropein which was very effective in reduction of the activity of the virus causing the case of viral hemorrhagic septicemia virus (VHSV) and Salmonid rhabdovirus as reducing the effectiveness of this virus to 10 and 30%, respectively, compared to the non-treatment (Erener *et al*., 2014). It was found that the addition of olive leaves to the diet by 25 g/kg resulted in a significant increase ($P<0.05$) in body weight, weight gain and dietary conversion coefficient compared to control treatment (Mahmoud *et al*., 2010). There was also, a significant improvement in the physiological performance of broiler when leaves were added (Lee-Huang *et al.,* 2011; Fayed *et al*., 20119). The aim of the study was to investigate the effect of adding different levels of olive leaf powder to the diet in the production and physiological performance of the broilers and determining the best level of addition.

MATERIALS AND METHODS

The present study was conducted in one of the poultry breeding fields of Hit city in Anbar province. The study lasted for seven weeks (49 days) from 18th of September 2014 to the 2nd of November 2014 to investigate the effect of adding OLP to the broiler diet on production performance and some physiological traits. Chicks were fed ad libitum on starter diet from 1-23 days, and finisher diet from 24-49 days. For each replicate, a plastic dish with a diameter of 38 cm was used and replaced after 10-days with a 45 cm and they were constantly raised to the top to be the same level of the bird's back. The water was provided to the chicks freely from the first day through the nipples and each pen in the experiment from the first day of raising the chicks with a nipple for each four chicks (4 nipples/pen). The olive leaves were obtained from local markets and from reliable sources, in a very pure and free of impurities, kept in sealed plastic containers until the use. The quantities allocated for each week were manually grinded and mixed with equal amounts of feed. After the required homogeneity was added, the quantities of feed were added weekly and filled in bags marked with special marks to distinguish them from each other. The rations were attended weekly to maintain active substances from damage.

The effect of the levels of olive leaves added to the diet per week was studied in the productive traits. The mean weight of the live body, the food conversion coefficient, the relative growth rate and the feed consumption rate were collected and blood samples were collected at the end of the experiment period (49 days) (Table 1). Three birds of each treatment were slaughtered and blood samples were collected in two tubes, the first tube contain the anticoagulant EDTA for complete blood tests (Hematological tests) and the second tube does not contain anticoagulant for biochemical tests as well as the conducted tests included the percentage of the size of cells Blood plasma, Concentrate of hemoglobin, Total glucose, Total cholesterol, triglycerides, HDL, LDL, VLDL, total protein and ALT, AST.

The experiment was of One-way analysis and all the data obtained in the present study were analyzed by SAS software 9.1 (8). A comparison between the mean values was done by using Multiplicity test (9) and (P<0.05), (P<0.01) was considered statistically significant (SAS, 2002).

RESULTS AND DISCUSSION

Live body weight

The effect of the experimental treatments on the body weight of the broilers (g) showed no significant differences between the experimental treatments in the first and second weeks. In the third week, T_4 was significantly higher (P<0.05) than T_2 and did not defer from T_3. At week 5, a significant superiority in T_3 (P<0.05) on T_1, T_4 was noted while week 6 showed a significant superiority in T_3 and T_4 on T_1 whereas week 7 showed a significant (P<0.01) superiority in T_2, T_3 on T_1 with no significant difference between T_2, T_3, T_4 (Table 3).

Table 1. The feed components and chemical composition

Feed content	Starter diet	Finisher diet
Yellow corn	53	57
44% Soybean	30	25
Protein concentration *	5	5
Wheat	10	10
Plant oil	1	2
Limestone	0.7	0.7
Salt	0.3	0.3
Total	100	100
Chemical composition ***		
Energy kcal/kg	3015	3117
Protein %	22 %	20%
Lysine %	1.25	1.11
Methionine and cysteine%	0.86	0.81
Calcium %	0.61	0.60
Phosphorus%	0.36	0.35

* Brocorn-5 special W is produced by WAFI BV ALBLASSERDAM HOLLAND, which contains 40% raw protein, 5% crude fat, crude fiber 2.20%, moisture 7.13%, ash 28.32 , Calcium 4.50%, phosphorus 2.65%, phosphorus available 4.68%, lysine 3.85%, methionine 3.70%, methionine + cystine 4.12%, tryptophan 0.42%, threonine 1.70% , Energy represented 2107, selenium 2.30%, copper 4%. ** According to chemical composition by NRC (1994).

Table 2. Chemical analysis of olive leaves

S. No	Ingredients	Content
1	Humidity %	9
2	Crude protein %	14.9
3	Fat %	7.5
4	Crude fiber %	20.17
5	Ash %	2.9
6	Dissolved carbohydrates %	45.53
7	Total	100

Chemical analysis of crushed olive leaves in the Faculty of Agriculture / University of Baghdad according to AOAC (1990)

Feed conversion coefficient

Table 4 shows the effect of the experimental treatments on the feed conversion coefficient of broilers (g/g). There was no significant differences between treatments in the first, fourth and seventh weeks. In the second week there was a significant decrease (P<0.01) in T_3 compared to T_1, T_4 and did not differ significantly with T_2. In the third week, the feed conversion coefficient in T_2 was significantly decreased (P<0.01) compared with T_1, T_4 and did not differ significantly with T_3. In the fifth week, T_1 and T_2 were significantly superior (P<0.05) on T_4 and did not differ significantly with T_3. In the sixth week, T_1, T_4 were significantly higher (P<0.05) than T_2 and did not differ significantly with T_3.

Relative growth rate

Table 5 indicated the effect of adding different levels of OLP on the relative growth weight. No significant difference between treatment in the first, second, third and fourth week was noted. In the fifth week, T_1, T_2 and T_3 were significantly higher (P<0.01) compared with T_4. At week 6, a significant superiority was noted in T_4 compared with other treatments. In the seventh week, T_2 was significantly higher (P<0.05) compared with T_1, T_4 and did not differ significantly with T_3.

Table 3. Effect of experimental treatments on average live weight

S. No	Weeks	Treatments				Significance level
		T_1	T_2	T_3	T_4	
1	1	*3.48 ± 172	2.88 ± 175	4.40 ± 183	3.84 ± 177	N.S**
2	2	3.78 ± 447	10.8 ± 468	14.9 ± 469	6.18 ± 478	N.S
3	3	25.1 ± 883[ab]	24.7 ± 848[b]	16.9 ± 910[ab]	14.6 ± 922[a]	0.05
4	4	47.4 ± 1464[b]	44.8 ± 1511[ab]	20.0 ± 1599[a]	13.2 ± 1575[ab]	0.05
5	5	26.1 ± 2091[b]	57.3 ± 2211[ab]	27.9 ± 2267[a]	22.0 ± 2091[b]	0.01
6	6	38.3 ± 2666[b]	36.5 ± 2709[ab]	75.5 ± 2853[a]	51.2 ± 2845[a]	0.05
7	7	48.2 ± 3131[b]	65.2 ± 3465[a]	129 ± 3492[a]	37.5 ± 3329[ab]	0.05

* Values represent the average ± standard error, ** GM: Not significant, a, b, c: The different letters within one row indicate significant differences between the coefficients at the level of significance (P00.01) and (P00.05).

Average feed consumption

The effect of the experimental treatments on feed consumption was detected (Table 6). A significant (P<0.01) superiority in T_3 on the other treatments was revealed at weeks 1, 2 and 5. In the third week, T_3 was higher (P<0.01) compared with T_1, T_4 and did not differ significantly with T_2. In the fourth week, T_2, T_3 were significantly higher than T_1 and T_4. All the supplemented treatments were higher than control treatment at week 6. In the seventh week, a significant (P<0.01) superiority in T_2, T_3 on the T_1 was detected and did not differ significantly with T_4.

The results of the current study showed a significant improvement in the body weight. It can be attributed that the OLP contain phenolic compounds that have a structure and function similar to the steroid hormones. These hormones increase the basic metabolic rate as they are building hormones and phenolic compounds have a role in improving the digestibility of feed, thus increasing the utilization of nutrients in the diet (Guinda *et al*., 2004). In addition, the OLP contains many active substances and glycosides that have roles as antioxidants to maintain and preserve the raw materials needed for growth.

The improvement in the productivity traits of body weight, feed consumption rate and feed conversion coefficient after adding OLP to the diet may be due to OLP contain of many nutrients that enhance the utilization of feed. Results of OLP analyzing by HPLC device showed seven phenolic compounds and the most important one was Oleuropein compound which represents 73% of the total phenolic compounds. These compounds act as an antibacterial agent, and anti-yeast (Christaki *et al*., 2011). The results were consistent with

Table 4. Effect of experimental treatments in the feed conversion coefficient of broilers (g/g)

S. No	Weeks	Treatments				Significance level
		T_1	T_2	T_3	T_4	
1	1	*0.020 ± 1.13	0.034 ±1.12	0.030 ± 1.19	0.028 ± 1.17	N.S**
2	2	0.027 ± 1.23[c]	0.033 ± 1.37[ab]	0.058 ± 1.47[a]	0.035 ± 1.29[bc]	0.01
3	3	0.045 ± 1.36[b]	0.083 ± 1.73[a]	0.046 ± 1.53[ab]	0.069 ± 1.44$_b$	0.01
4	4	0.039 ± 1.47	0.058 ± 1.43	0.057 ± 1.38	0.018 ± 1.36	N.S
5	5	0.097 ±1.67[b]	0.053 ±1.53[b]	0.056 ±1.73[ab]	0.147 ± 2.05[a]	0.05
6	6	0.092 ± 2.11[b]	0.175 ± 2.73[a]	0.242 ± 2.41[ab]	0.153 ± 1.82[b]	0.05
7	7	0.301 ± 2.86	0.085 ± 1.91	0.379 ± 2.35	0.406 ± 2.99	N.S

* Values represent the average ± standard error, ** GM: Not significant, a, b, c: The different letters within one row indicate significant differences between the coefficients at the level of significance (P00.01) and (P00.05).

Table 5. Effect of experimental parameters on relative growth rate of broilers

S. No	Weeks	Treatments				Significance level
		T_1	T_2	T_3	T_4	
1	1	*1.21 ± 120	1.03 ± 121	1.48 ± 124	1.36 ± 122	N.S**
2	2	2.14 ± 88.5	1.59 ± 91.1	1.41 ± 87.5	2.72 ± 91.8	N.S
3	3	2.45 ± 65.4	1.77 ± 57.7	2.06 ± 64.0	2.55 ± 63.3	N.S
4	4	0.950 ± 49.5	2.69 ± 56.1	2.39 ± 54.9	1.00 ± 52.2	N.S
5	5	1.91 ± 35.3^a	1.36 ± 37.6^a	1.15 ± 34.5^a	1.75 ± 28.1^b	0.01
6	6	0.777 ± 24.1^b	1.22 ± 20.2^b	2.02 ± 22.8^b	2.46 ± 30.5^a	0.01
7	7	1.63 ± 16.0^b	$0.601 \pm 24.4_a$	2.71 ± 20.0^{ab}	2.46 ± 15.6^b	0.05

* Values represent the average ± standard error, ** GM: Not significant, a, b, c: The different letters within one row indicate significant differences between the coefficients at the level of significance (P00.01) and (P00.05).

previous work of (Bouaziz *et al*., 2008) who showed that the addition of olive leaves to the diet by 25 g/kg resulted in a significant increase in body weight, weight gain, and dietary conversion coefficient compared with control treatment, as well as addition of 20 g/kg of OLP increased body weight, weight gain and dietary conversion coefficient in the sixth week of the age of the chick (Tarek *et al*., 2013).

Physical characteristics

Table 7 showed that T_3 and T_4 were significantly higher (P<0.01) than T_1 and T_2 in the percentage of blood cell volume. The improvement in the percentage values of the size of blood cells may be due to the effect of OLP which was characterized by its effectiveness in promoting the distribution of oxygen to tissues or perhaps due to the increase in blood volume as a reflection of the increased need for oxygen by cells. Adding OLP at the level of 10 and 15 g/kg to the laying chicken diet had a high significant effect (P<0.01) in the percentage of the size of the blood cells (Aytul, 2010). Also, Table 7 pointed that T_3 and T_4 had a highly significant effect (P<0.01) in the concentration of hemoglobin compared with T_1 and T_2.

For the percentage of blood cell size and hemoglobin concentration, Table 7 showed a consistence with both body weight and weight increase rates. This supports the idea that the improvement of blood characteristics is positively reflected in productive traits. For example, increasing the size of the blood cells increases the share of cells from oxygen thus improving the growth of body cells. Additionally, the improvement in blood hemoglobin concentrations in the treatments may be due to the addition of OLP to the basic diet, which increases the iron absorption efficiency by 43% higher

Table 6. Effect of experimental treatments on feed consumption rate of broilers (g/f)

S. No	Weeks	Treatments				Significance level
		T_1	T_2	T_3	T_4	
1	1	$*1.26 \pm 147^c$	2.55 ± 148^c	1.11 ± 167^a	1.08 ± 158^b	0.01
2	2	1.29 ± 337^d	3.58 ± 401^b	1.37 ± 420^a	2.28 ± 390^c	0.01
3	3	13.0 ± 592^c	0.597 ± 656^{ab}	2.64 ± 676^a	2.38 ± 640^b	0.01
4	4	20.1 ± 854^b	21.0 ± 946^a	0.908 ± 947^a	0.465 ± 887^b	0.01
5	5	22.1 ± 1048^b	26.4 ± 1074^b	12.9 ± 1158^a	3.86 ± 1051^b	0.01
6	6	25.0 ± 1211^b	29.1 ± 1351^a	29.5 ± 1390^a	1.32 ± 1358^a	0.01
7	7	28.9 ± 1306^b	37.1 ± 1445^a	31.6 ± 1435^a	0.382 ± 1389^{ab}	0.05

* Values represent the average ± standard error, ** GM: Not significant, a, b, c: The different letters within one row indicate significant differences between the coefficients at the level of significance (P<0.01) and (P<0.05).

Table 7. Effect of experimental treatments on blood characteristics of broilers at 49 days

S. No	Blood properties	Treatments				Significance level
		T_1	T_2	T_3	T_4	
1	Blood mass%	0.032 ± 28.9^c	0.595 ± 28.1^c	$^*0.074 \pm 35.8^a$	0.592 ± 32.1^b	0.01
2	Hemoglobin%	0.012 ± 8.97^c	0.199 ± 8.71^c	0.136 ± 11.3^a	0.198 ± 10.0^b	0.01
3	Glucose%	5.54 ± 319^a	1.45 ± 303^b	1.73 ± 274^c	1.66 ± 231^d	0.01
4	Cholesterol	1.15 ± 157^a	1.15 ± 132^b	1.45 ± 103^d	1.45 ± 126^c	0.01
5	Triglyceride	1.15 ± 113^a	0.881 ± 91.6^b	0.656 ± 82.2^d	1.19 ± 88.3^c	0.01
6	HDL	1.45 ± 65.3^d	1.45 ± 72.6^c	2.08 ± 124^a	0.536 ± 98.4^b	0.01
7	LDL	0.405 ± 69.0^a	0.705 ± 42.6^b	0.744 ± 36.8^c	3.05 ± 32.3^c	0.01
8	Total protein	0.008 ± 3.62^d	0.008 ± 3.97^c	0.135 ± 5.23^a	0.028 ± 4.88^b	0.01
9	ALT	2.60 ± 173^a	1.45 ± 152^b	5.36 ± 110^c	5.54 ± 111^c	0.01
10	AST	1.45 ± 35.3^a	0.702 ± 20.6^b	0.881 ± 11.6^c	1.01 ± 14.1^c	0.01

* Values represent the average ± standard error, a, b, c: The different letters within one row indicate significant differences between the coefficients at the level of significance ($P<0.01$) and ($P<0.05$)

compared to the basal diet, which leads to an increase in the efficiency of hemoglobin generation due to the containment of OLP on phenolic, which is an antioxidant compounds and also contains vitamins including vitamin C and all these elements support the union of iron with mucus, which works on melting iron and make it available for absorption by the cells absorbed intestine (Lee-Huang *et al*., 2011). The highest concentration of glucose was for T1and that all levels of addition of OLP were significantly reduced ($P<0.01$) of serum glucose concentration (Table 7).

The role of OLP in lowering blood glucose was due to its effective antioxidant role in protecting pancreatic cells from oxidation, in addition to activating the pancreatic antioxidant defense systems and thus protecting the pancreatic cells from damage or oxidative injury that regulates the release of the insulin hormone to maintain the level of glucose within the normal blood range in addition, OLP plays an important role in stimulating the release of insulin by pancreatic beta cells, thereby reducing the level of glucose in the serum as well as its role in protecting cells from damage caused by oxidative stress when the level of sugar in the blood increases, the insulin hormone works to withdraw the glucose into the storage areas of the liver, mainly the muscle, where it is stored in the form of a glycogen, thus reducing the excessive rise of blood sugar (Grovaris *et al*., 2010).

Table 7 showed a significant decrease in cholesterol concentration in the serum ($P<0.01$) for T_3 followed by T_4 and then T_2 while T_1 recorded the highest level of cholesterol concentration. Increasing the level of OLP reduces the concentration of cholesterol and fat when chicken is exposed to stress. OLP contains a hydroxyl group that gives the ability to give a hydrogen atom to the free root of the fat, thereby inhibiting lipid oxidation, which reflected in the protection of Low-Density Lipoproteins (LDL) from oxidation. Olive leaves contain vitamin E, which works to reduce the level of fat (hypolipdemic) by preventing the oxidation of LDL and increase the level of HDL in plasma (Qaqo and Hassan, 2010). The decreased level of cholesterol by increasing the concentration of OLP may be due to the control of OLP on cholesterol metabolism. This was in line with what 17 mentioned, pointing to the low level of cholesterol in the blood of rats due to the effect of chemical compounds active in OLP, which may play an important role in increasing cholesterol metabolism.

Table 7 showed a significant ($P<0.01$) decrease in the concentration of triglycerides in the serum of treatments supplemented with OLP. T_1 showed the highest concentration of triglycerides in the serum. This result was in agreement with previous work of (Fayed *et al*., 2011) who demonstrated that addition of OLP to broiler diet led to a significant decrease in the level of triglycerides and total cholesterol in blood plasma. It can be attributed to its role in inhibiting the secretion of corticosteroids from the adrenal cortex, that was reflected in increased thyroid activity, thus reduces the level of triglycerides and cholesterol blood plasma. Or it can be attributed to the role of vitamin C in lowering cholesterol, triglyceride, and non-high-density lipoproteins in the serum due to its important role in the bile acid metabolism as well as its role in the stabilization of fat and its protection from oxidation. It also prevents the oxidation of low-density lipoproteins and raises levels of High Density Lipoproteins (HDL) in the serum (Tubour and Guedon, 2014).

This is due to the ability of the OLP to reduce the percentage of liver fat and its effect in lowering level of cholesterol (hypocholesterolemic) and the level of hypotriglyceridemic in blood plasma to the high antioxidant efficiency of poly phenol compounds for olive leaf by inhibiting the activity of free radicals, especially above the negative oxide and hydroxyl root (Mancean *et al*., 1942).

Significant differences between additive treatments compared to control treatment were noted (Table 7). The addition of OLP showed a significant increase ($P<0.01$) in HDL level in serum compared with control treatment. Table 2 showed significant differences ($P<0.01$) between treatments in the level of low- density lipoprotein in the blood serum. There was a significant decrease ($P<0.01$) in the level of LDL in the serum of birds for T_2, T_3 and T_4 compared to T_1.

The antioxidants in the olive leaves maintain the raw materials, most of which are fatty substances and the role of the treatments as antioxidants in poultry diets helps to protect the lipoproteins and other fatty compounds from oxidation, resulting in an abundance of these substances (Pereira *et al*., 2012). This was consistent with what (Fayed *et al*., 2009) indicates that the ability of OLP to lower the levels of LDL in serum and beta-triglycerides leads to lowering the level of cholesterol and triglycerides in the serum. HDL is an irreversible transfer of cholesterol and fat from the tissue and far to the liver to turn it into bile acid, or is thrown out of the body or used in the process of building fat. Additionally, (Qaqo and Hassan, 2010) reported that using OLP in broiler diets decreased the level of total cholesterol and LDL in serum and this showed the reduced properties of cholesterol relative to the anti-fat in olive leaf, which may prevent the absorption of cholesterol.

Table 7 showed a significant increase ($P<0.01$) in the total protein concentration in T_3 followed by T_4 while the T_2 decreased and the lowest concentration of the total protein in the serum was in T_1. The total protein plays an important role in maintaining the balance of fluid volume between blood and tissue and acid-base balance. It is a vector of many feed compounds from one tissue to another in the body such as fat, carbohydrates, vitamins, minerals and hormones. It also plays an important role in the synthesis of enzymes and hormones, transmission of genetic information and immunity as well as to balance the blood pressure in tissues (Gordon *et al*., 2001). The high concentration of total plasma protein was due to the addition of OLP, which in turn was anti-oxidant, resulted in increasing hepatoprotective activity. In addition, OLP increases the level of total protein in the serum by stimulating protein synthesis and accelerating the regeneration and production of liver cells and prevents the process of gluconeogensis and thus prevents the degradation of the protein and converting it to glucose. This may lead to an increase in total protein concentration in (Aytul, 2010).

Significant decrease ($P<0.01$) in the level of concentration of ALT and AST for the addition of OLP compared to control treatment (Table 7). The control treatment recorded the lowest concentration of ALT and AST. The low activity of the enzyme ALT and AST in the serum reduces the process of building glucose from non-carbohydrate sources such as proteins, which reduces the process of destruction of blood proteins and cells of the body and then its ability to maintain the levels of proteins and blood glucose within normal levels, and the role of antioxidants in maintaining the level of fat in the blood and around the organs, as the excess glucose from the body needs to turn to fat and low blood glucose level as a result of the addition of antioxidants to the chicken diet is evidenced of the ability of antioxidants in maintaining the function of manufacturing the liver by increasing the process of metabolism for glucose and its withdrawal from blood to cells in the liver for the purpose of oxidation to release the energy necessary to meet the needs of the maintenance and production (Mancean *et al*., 1942).

The high or low levels of these enzymes are reflected on the health status and safety of body organs from functional deviations in the liver and other body organs. These enzymes also have a direct relationship with corticosteroids and the effectiveness of these enzyme decreases when the hormone is reduced in the blood. One indication of the low level of this hormone in the blood is the high concentration of protein (Latif and Mahmoud, 2017).

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