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EFFECT OF *HYSSOPUS OFFICINALIS* L. ON BLOOD PARAMETERS AND LIVER ENZYMES IN BROILER CHICKS

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ABSTRACT : This study carried out to explain the effect of *Hyssopus officinalis* powder ,on blood picture and liver enzymes, One hundred sixty (160) broiler chicks strain (Ross 308) one day old were used in our experiment. This experiment was conducted in the poultry field of the College of Veterinary Medicine, University of Baghdad for 35 days from (10/October/2020) to (15/November/2020). Chicks were randomly allocated in to four experimental treatments (40 chicks for each treatment) with two replicates (each of 20 chicks) as following: G1:- The chicks were feed on basil diet without *Hyssopus officinalis* powder (control group) G2 :- The chicks were feed on stander diet contain *Hyssopus officinalis* powder (1gm / kg feed) G3:- The chicks were feed on stander diet contain *Hyssopus officinalis* powder (1.5gm/kg feed) G4:- The chicks were feed on stander diet contain *Hyssopus officinalis* powder (2gm/kg feed). The results of the current study were to increase the percentage of red blood cells and white blood cells in chicken groups that had *Hyssopus officinalis* powder (1.5mg/kg.feed, 2gm/kg feed), which makes the *Hyssopus officinalis* a promising feed in the future of poultry nutrition.

Key words : *H. officinalis*, blood parameters, liver enzymes, broiler chicks.

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INTRODUCTION

Poultry meat is eaten all over the world and has grown in popularity in many countries over the last few decades. The relatively low production costs, the rapid growth rate of poultry, the high nutritional value of the meat and the launch of many new further processed goods are all factors in this increased consumption (Shai Barbut, 2016).

Herbs have received a lot of attention in recent years because of the rise in antibiotic-resistant bacteria and synthetic antibiotic side effects. Medicinal plants are known for producing a variety of synthetic compounds to protect themselves from a variety of pathogens and thus can be used as antimicrobial materials (Donlan, 2002). One of these herbs, which gained its medicinal importance from the time of ancient civilizations, which contains many substances with antibacterial activity and is considered an anti-oxidant is a herb *Hyssopus officinalis* L. Research studies have confirmed its clinical importance, as this herb is Hyssop essential exhibited antimicrobial action against *Streptococus pyogenes*, *Staphylo aureus*, *Candida albicans* and *Escherichia coli* (Kizil *et al*, 2010; Vlase *et al*, 2014; Kizil and Uyar, 2006). Also reported that the chemical components of iso pinocamphone is reported for its good antibacterial activity. Similar results are reported by Saeedi and Morteza Semnani (2009). The main components of *H. officinalis* oil were cis-pinocamphone (26.85%), β-pinene (20.43%), trans-pinocamphone (15.97%), (alpha-elemol, α- elemol) (7.96%), durenol (3.11%), β-phellandrene (2.41%), caryophyllene (2.34%), (E)-2,6-dimethyl-1,3,5,7-octatetraene (2.27%), 3(10)-caren-4-ol, acetoacetic acid ester (2.14%), bicyclogermacrene (1.83%), myrtenol (1.73%), germacrene-D (1.68%), limonene (1.56%), γ-eudesmol (1.36%) and linalool (1.08%) (Hussein *et al*, 2015).

The polyphenolic compounds luteolin, diosmin, quercetin, apigenin and their glucosides, as well as phenolic acids such as caffeic acids p-hydroxybenzoic, syringic, ferulic, protocatechuic and chlorogenic acid, were the key constituents in *H. officinalis.* The terpenoids β-pinene, isopinocamphone and pinocamphone were discovered in essential oils from *H. officinalis* aerial parts (Fathiazad *et al*, 2011).

Natural antioxidant mechanisms in biological organisms include enzymes like glutathione peroxidase, superoxide dismutase, catalase and lipoic acid, as well as non-enzymes like selenium, vitamin E, C and A (Surai, 2007) checked the detailed roles of biological antioxidant systems, antioxidants defend against free radicals by inhibiting the action of pro-oxidant enzymes or directly scavenging free radicals in biological organisms' bodies. (Irshad and Chaudhary, 2002; Abd Ellah *et al*, 2010).

Since, the liver is the primary detoxifying organ and maintains metabolic homeostasis, liver diseases are a worldwide medical concern. The liver metabolizes a variety of compounds that result in the production of free radicals (FR). Antioxidants, on the other hand, scavenge FR and keep the oxidative/antioxidative balance in the liver in check. Oxidative stress occurs when the liver's oxidative/antioxidative balance is impaired. Oxidative stress causes harmful processes in the liver, resulting in liver disease. In order to preserve homeostasis, antioxidants must be restored. Consuming natural antioxidant-capable compounds is one way to replenish antioxidants (Sael and Pablo, 2015).

Hyssopus officinalis L. has been shown to affect the release of a variety of cytokines in a number of previous studies (Wang *et al*, 2008; Hou *et al*, 2009 and Hou *et al*, 2010).

MATERIALS AND METHODS

This experiment was conducted in the poultry field of the College of Veterinary Medicine, University of Baghdad for 35 days from (10/October/2020) to (15/ November/2020). Chicks were randomly allocated in to four experimental treatments (40 chicks for each treatment) with two replicates (each of 20 chicks) as following:

G1: The chicks were feed on basil diet without Hyssopus Officinalis powder (control group)

G2 : The chicks were feed on stander diet contain Hyssopus Officinalis powder (1gm / kg feed)

G3: The chicks were feed on stander diet contain Hyssopus Officinalis powder (1.5gm/kg feed)

G4: The chicks were feed on stander diet contain Hyssopus Officinalis powder (2gm/kg feed)

Biochemical parameters

Blood sampling : Blood samples 80 were collected randomly (20 chicks from each group 10 chicks from each replicate) at 35 days of age,

The glsses test tubes with anticoagulant, which was Potassium Ethylene Diamin Tetra Acetic Acid (K3-EDTA) uses to measure (RBC) red blood cells count, packed cells volume %, (HB) hemoglobin concentration, (WBC) white blood cells count, (H) Heterophil / (L) Lymphocyte ratio. All hematological parameters (Leukocytes and Erythrocytes count, PCV % and HB concentration) were calculated by using hematology analyzer as in which it is specific for veterinary blood tests; these tests were conducted in the hematology unit /laboratories department of Veterinary Directorate.

Alanine aminotransferase (ALT), Aspartate aminotransferase (AST) : The pyruvate which was produced by transamination of ALT reaction with 2, 4 dinitrophenylhydrazine to give a colored haydrozon, while oxaloacetate that formed in a reaction with AST decarboxylated spontaneously to pyruvate, which again measured by hydrazine formation. In both measured in colorimeter at 510 nm wave length (AL-Oumary, 2001).

This method for measured (ALT, AST) depends on used (Kit) get from local market. This kit depend on the calorimetric method then depend on label of (RANDOX company) supplied this kit.

Statistical analysis

Statistical analysis of data was performed using SAS (Statistical Analysis System - version 9.1). One - way, Two way ANOVA and Least significant differences (LSD) post hoc test were performed to assess significant differences among means. $P < 0.05$ is statistically significant (SAS, 2010).

RESULTS AND DISCUSSION

Table 1 showed that red blood cells (RBC) ,Packed cell volume (P.C.V), Hemoglobin (Hb) and white blood cell count (WBC) are significantly ($p \leq 0.05$) higher values in G4 than those all other groups followed G3, which recorded significantly ($p \leq 0.05$) higher values than those G1 and G2 .The H/L ratio in this experiment of G1 showed significantly ($p \leq 0.05$) higher values than those G2, G3 and G4, followed G2, which showed significantly ($p \leq 0.05$) higher than those all groups, while G4 showed significantly ($p \leq 0.05$) lower values than those all groups.

The results showed that all the experimental groups significantly increased ($P \leq 0.05$) RBC, HB, PCV, compared to the control group. Conversely, the H/L ratio was lower in all the experimental groups than the control group.

This conclusion was consistent with prior research of Kontecka *et al* (1997) that found greater erythrocyte counts, hemoglobin levels and haematocrit values in the plant confine antioxidant component group compared to the control group.

Table 1 : Effect of different concentration of hyssop powder in feed on blood pictures in different groups of broilers (35 days) (Means ±SE).

Groups	WBC	RBC	Hb	PCV	H/L Ratio
G1	80.71±0.10 d	1.81±0.01 d	8.14±0.008 d	26.59±0.09 d	0.54±0.009 a
G2	82.12±0.23 c	1.92±0.01 c	9.05±0.008 c	28.04±0.01 c	0.43±0.006 b
G3	86.40±0.12 b	2.05±0.007 b	10.27±0.01 b	29.05±0.01 b	0.36±0.009 c
G4	87.60±0.06 a	2.26±0.06 a	11.55±0.009 a	30.55±0.01 a	0.35±0.008 c
LSD	0.4107	0.0992	0.0269	0.1328	0.0242

Means with a different letter in the same column are significantly different (P<0.05)
G1: Control (basil) diet. G2: group 2 given (1 gram dried herb / 1 kg feed).
G3: group 3 given (1.5 gram dried herb / 1 kg feed). G4: group 4 given (2 gram dried herb / 1 kg feed).

Table 2 : Effect of different concentrations of hyssop powder in feed on liver enzymes (ALT/AST).

Groups	ALT	AST
G1 (control)	27.10±0.30 a	86.50±0.57 a
G2 (1g/kg)	19.95±0.49 b	73.75±1.04 b
G3 (1.5g/kg)	15.45±0.51 c	65.80±1.10 c
G4 (2g/kg)	12.05±0.70 d	58.75±0.87 d
LSD	1.4782	2.6025

Means with a different letter in the same column are significantly different (P<0.05)
G1: Control (basil) diet.
G2: group 2 given (1 gram dried herb / 1 kg feed).
G3: group 3 given (1.5 gram dried herb / 1 kg feed).
G4: group 4 given (2 gram dried herb / 1 kg feed).

In the blood of broiler chickens feed vitamin C-supplemented diets, Satterlee *et al* (1989) found a lower number of heterophils and a larger number of WBC and lymphocytes. As a result, the heterophil-to-lymphocyte ratio in this group of chickens has a high value.

Higher erythrocyte counts, hemoglobin levels, and haematocrit values in the blood of old ducklings from the experimental group (Kontecka *et al,* 2006) could indicate a positive impact of feeding reproductive ducks vitamin C-supplemented diets and the herb contains high concentrations of vitamin C, which has a positive effect on the blood picture.

Table 2 showed the changes in the mean values ±SE of serum (alanine aminotransferase ALT) and (aspartate aminotransferase AST) of different experimental groups.

In the (G4) group there were highly significant at level (P<0.05) decrease in (ALT) and (AST) when compared with control negative group and other groups.

The activity of AST and ALT enzymes of G1 recorded significantly ($p \leq 0.05$) higher values than other groups. While the G2 significantly exhibited ($p \leq 0.05$) higher values than those in G3 and G4. Subsequently, the G1 and G2 consecutively significantly ($p \leq 0.05$) showed higher values than other groups, while G3 recorded significantly ($p \leq 0.05$) higher than the G4.

In the current study, the liver enzymes in all treated groups recorded reduction of ALT and AST when compared with control group, the hepato protective action of *Hyssopus offinalis* might be due to prince of several active component, They added that the protective efficacy of *Hyssopus offinalis* is very promising as evidenced by the reversal of the altered values following administration probably by promoting regeneration of hepatocytes that restore integrity and it was confirmed by the Histopathological.

The herb's beneficial effect on liver function, as evidenced by the study's enzyme values, is owing to the herb's strong antioxidant content, which helps to minimize free radicals that cause organ tissue deterioration. These findings corroborate (Sael and Pablo, 2015), who noted that because the liver is the primary detoxifying organ and maintains metabolic balance, liver illnesses are a worldwide medical problem. The liver metabolizes a variety of chemicals that result in the production of free radicals (FR). Antioxidants, on the other hand, scavenge FR and keep the oxidative/antioxidative equilibrium in the liver in check. Oxidative stress occurs when the liver's oxidative/antoxidative equilibrium is disturbed. Oxidative stress causes harmful processes in the liver, resulting in liver disease. In order to preserve homeostasis, antioxidants must be restored. Consuming natural antioxidant-capable substances is one way to replenish antioxidants.

Antioxidants are chemicals that can inhibit or delay the oxidation of an oxidizable substrate at low concentrations. Antioxidants are found in our bodies and in a variety of foods. Antioxidants have a strong affinity for FR compounds and can scavenge them to safeguard our health. Antioxidant compounds donate electrons to FR to lower their reactivity and keep the cellular pro-oxidant/antioxidant equilibrium in check. Antioxidant molecules come in a variety of shapes and sizes. Natural chemicals have been extensively examined and are linked to a variety of disorders, including liver ailments (Halliwell, 1990; Sael and Pablo, 2015). These findings corroborate

those of Papageorgiou *et al* (2008), who found that flavonoids predominated throughout the flowering stage of *L. hyssop*. According to Alizadeh (2011), the greatest phenolic content and antioxidant activity in hyssop herbal was obtained at the flowering stage.

Because of its antioxidant properties, vitamin C may help to reduce hepatic cellular harm. Vitamin C reduced lipid peroxidation (LPO) levels and liver enzyme activity while increasing antioxidant enzyme activity (Mekinova, 1995; Krishnamoorthy and Sangeetha, 2008).

CONCLUSION

The conclusion of the research is that this herb is useful in feed additives, as it improves the health status of the bird by improving the blood picture and improving the functioning of the liver functions because it contains substances that act as antioxidants or antibiotics.

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