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The effect of aqueous extract of *Allium sativum* on some hematological characteristics of Broiler chicken

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Abstract

This study was conducted to investigate the effect of aqueous garlic extract on some hematological characteristics in broiler chicken represented by total erythrocyte count (TRBC), hemoglobin concentration (Hb) , packed cell volume (PCV) , Erythrocytes sedimentation rate (ESR), Total leukocytes count (TLC) and differential leukocytes count (DLC).

A total of 120 birds of broilers chicken − fawbro strain 0 were taken in one day then divided randomly into three equal groups, all groups were feed a commercial basal ration of broilers , the birds of group G were drenching 1ml / day of aqueous garlic extract of 50% concentration, the second group G2 were drenching with 1m /day aqueous garlic extract of 25% concentration and the third group, control were not given garlic extract. blood samples were collected at the end of experiment at the 8th week of age, then Hb conc. TRBCs, PCV, ESR, DLC, TLC, were measured and the results were as follow:-

1. **A significant increased P< 0.05 in Total erythrocyte count in G1 & G2 groups compared with other group .**

2. **A significant increased P< 0.05 in Hb conc. In G1 group compared with other group .**

3. **A significant increased P< 0.05 in ESR in control group compared with other groups.**

4. **A significant increased in PCV in G1 group compared with other groups, P< 0.05 while there was no significant different between G2&C .**

5. **No significant differences between groups in total leukocytes count**

6. **A significant increase in lymphocyte percentage and significant decrease in heterophils percentage in G1 group compared with control group, while no significant different between G1&G2 .**

7. **Percentage of Monocytes , Basophiles & Eosinophils were not affected significantly in groups.**

The previous result refers to the positive effect of aqueous extract of *Allium sativum* in 50% concentration and less degree of 25% conc. Also it has a benefit to the body immunity status by increasing numbers of lymphocytes that has an active role in immunity thus garlic serve to enhance human feed as protein and egg of chicken .

Introduction

Garlic is the best know herb in the world for its medical and culinary uses . It is a member of the lily family , one its closest relative being the onion .

The English name for Garlic originates back to Anglo-Saxon time , being derived form gar (a spear) and lac (a plant). This is a reference to the shape of the plant's leaves, which are long, flat and thin.

However, writing and uses of Garlic date back to the time of plinty ,in the first century .He states that Garlic and onion were called upon as gods by Egyptians undertaking oaths. Is mentioned in old Garlic

English writing from the length to the tenth to the fifteen century .Chuacen, for example, refers to Garlic as poor man's trade , meaning an elixir or ' cure- all ' (Alternative healthzine , 2000). Principle constituent of garlic are volatile oil contains daillyl-disulphide C6H10S2, allyl propyl disulphide C6H12S2, poly sulphides unkown alkaloid m.p. 174 C ؛, the glycoside alliin C6H11O3N2 and the enzyme alliinase which decompses alliin into allicin . the bulb contains muciiage vitaminsA,B1 and B2 ,starch, albumin ,sugar ,saponins,nicotinamide sativine, antibiotic allistatin 1 and allistatin ةة which are broad spectrum against fungi (Hussein ,1986) .Allicin the active principle isolate from garlic (chkravarty , 1967). Allicin is naturally produced when is damage ,allowing the release and inter-reaction of two substances, the non-protein amino acid alliin and the enzyme

alliinase (Krest &Keusgen,1999).Allicin further has a remarkable ability to permeare living tissue (Miron *et al*.,2000).Garlic extract is identified as a potent inhibitor of leukocyte migration through endothelial cell monolayers (Frass *et al*.,2001).Garlic is one of the most studied plant .Research shows that Alicin is an antioxidant.It increased blood levels of catylase and glutathione peroxidase ,two powerful antioxidant enzymes .other sulfur compounds inhibit lipid peroxidation in the liver ,are action considers be the main feature of aging in the liver cells (nutrisania ,1998).Human studies confirm immune stimulation by garlic subjects receiving aged extract at 1800 mg aday for three weeks showed a 155.5% increase in natural immune cell activity that kills invaders and cancer cells .Other subjects receiving large amount of fresh garlic of 35 g a day ,equivalent to cloves , showed an increase of 139.9% in six weeks , patients with AIDS receiving large amount fresh garlic extract showed an enhancement of natural killers cells from aseriously low level to a normal level (Borek , 2000).

Avian blood is very similar in many ways to that of the mammal but there are certain characteristics by which it differs from mammalian blood . The most important of these differences are as follows:-

1. **The erythrocytes are nucleated**.
2. **The cells associated with coagulation are not platelets but are nucleated thrombocytes closely resembling erythrocytes in appearance .**
3. **The initial pathways of blood coagulation differ considerably.**
4. **The most commonly occurring of the polymorphonuclear granulocytes ,the equivalent of the mammalian neutrophil, possesses acid – staining cytoplasmic granules and is called the heterophil (Hodges,1965).**

This study was conducted to investigate the effect of two concentrations of aqueous garlic extract on some hematological characteristics of Broiler chickens.

Materials and methods

This study was carried out on the broiler chickens .the laboratory analysis work were done in the human educational hospital of al-diwaniya. The study included the evaluation of the effect of drenching aqueous extract of *Allium sativum* at two concentration 25% and 50% and dose 1ml/day. A total of 120 birds at one day old of nearly similar body weight were divided in to three equal groups. The first group G1 were drenched with aqueous garlic extract of 50%conc,G2 group were drenched with aqueous garlic extract of 25% conc. while the third group were control

group.The feeding of aqueous extract of garlic continuoced from 2ed day till 8th week of old .collecting blood samples from the wing and jugular veins then some hematological characteristics were measured including total RBCs count,hemoglobin concentration, packed cell volume, Erythrocytes sedimentation rate ,total &Differentials leukocytes count.Hb conc. Was determined by cyanomethemogloben method while pcv measured by microhematocrite method &total leukocytes count (TWBCs)calculated by adirect method which involves the use of Natt & herricks solution hemocytometer chamber accourding to Campbell (1988).Also total erythrocytes count was determined by using hemocytometer chamber &hymes solution accourding to power (1989).Differential leukocytes count was done by preparation of blood smear then stained with wright stain accourding to Campbell(1988).Erythrocytes sedimentation rate was determined by wastergren method &expressed as mm/hr (saeed &Al-habbib,1990)

Method of preparing aqueous garlic extract

prepared accourding to the method of AL- delaimy and Ali , (1970) . that can briefly discussed by cleaning garlic bulb by sreilized knife then weight ratio of 1 (weight garlic) :1 (volume distilled water) . Result 100% concentration aqueous garlic extract . to obtain 50% concentration we used 1 (weight garlic) :2 (volume distilled water) . to obtain 25% concentration . we used 1:4 ratio put the contents in electrical mixer (national) and blend rapidly to 2-3 min. then filtered in buchner funnel and filter paper (Edrol – n0.2) with pressure . the extract gathered in buchner flask and the fluid consider aqueous garlic extract .

statistical Analysis

Data were analysed by analysis of variance ,ANOVA, F-test& Confidence intervale test,least significant difference LSD according to Al-Mohamad et al.,1986.

RESULTS&DISCUSSION

blood samples of 30 bird were taken randomly from each group result of testing blood parameters are detailed in the following tables show significant increase $p<0.05$ in number of total erythrocytes count in treated groups with garlic agueous . extract in comparison with not - treated group (control) .

(table- 1) .

Total Erythrocytes count 10^6 cell\mm^3

Group	*M-*	± *SE*
G1	2.8 a	± 0.190
G2	2.6 a	± .106
C	1.5 b	±0.270

The G1 birds exhibited (revealed) significant increased p<0.05 in values of hemoglobin concentration compared with G2&C groups these changes may be due to garlic considered biological antioxidant because of sulphar compounds contains in it (table2)

Hemogloben concentration Hb gm / 100 ml

Group	*M-*	*SE*
G1	12 a	± 0.101
G2	9.5 b	± 0.130
C	0.9 b	± 0.081

Packed cell volume also affected (increased)significantly p<0.05 in G1 group compared with G2&C group(table3)

Packed cell volume %PCV

Group	*M-*	*SE*
G1	35.3 a	± 0.120
G2	30.0 a	± 0.281
C	28.0 a	± 0.360

Estimation of erythrocytes sedimentation rate showed significant increased p<o.o5in control group compared with other group (table4)

Erythrocytes sedimentation rate ESRmm\hr

Group	*M-*	*SE*
G1	3.2 c	±0.650
G2	3.9 b	±0.740
C	5.8 a	±0.610

The results of total leukocyte count TWBCs revealed no significant difference between groups p> 0.05 that illustrate in (toble 5) .

Total Leukocytes count TWBCs 10^9 cell \ liter

Group	*M-*	*SE*

G1	17.35 a	± 0.071
G2	17.34 a	± 0.130
C	17.40 a	± 0.062

While values of treatment & we can notice the changes only in numbers (percentage)of significant decrease p < 0.0.5 in number of hetrophilia compared to control group , in the some time there were on significant changes in number of eosinophils , basophilic and monocytes . (table 6)

Differential leukocytes count DLC %

Group	***l.***	***h.***	***Eos***	***Ba***	***Mo***	
G1	73.3 a ±0.132	15.9 b ±0.230	0.7 a ±0.151	0.6 a ±0.173	9.3 a ±1.012	M- Se
G2	70.8 a ±0.105	18.0 b ±0.270	0.8 a ±0.230	0.5 a ±0.280	9.2 ±1.080	M- Se
C	58.4 a ±0.43	30.8 a ±0.180	0.7 a ±0.430	0.5 a ±0.330	9.4 ±1.063	M- Se

M- = MEAN
SE = STANDARD ERROR
g1 = treated with 50 % aqueous garlic extract
g2= treated with 25 % aqueous garlic extract
c=control group
l = lymphocytes
h= heterophils
eso= easinophils
bas= basophils
mo= monocytes
a,b,c = different litters refers to that there's significant differences between groups p > 0.05 while similar litters refers to no significant differences between groups .

ESR is dependent on two main forces : the forces of gravity , causing cells to settle and the fractional resistance of the surrounding plasma, which holds the cells in suspension (sturkie , 1986)

Evaluation of avian Erythrocytes includes the PCV , TRBCs, HB , Corpulscular volume, the Reticulocytes count & erythrocytes morphology . among the factors which may influence the ESR are the type of plasma proteins and lipids (sturkie &textor , 1960) the changes the degree in ESR is approximately propor tional to the degree of lipaemia and the increase in ESR are brought by the reduction in red cells and by the production of

hyperlipaemia . (ARCHER, 1965) . The Hypolipidemic effects of garlic have recorded in many clinical and experimental studies (KAMANNA AND CHANDRASE , 1984 : ROTZCH , ET AL ., 1992)and others , from this hypolipidemic effect we translate the decrease in number of ESR in group treated with garlic compared with other .

The blood hemoglobin concentration and packed cell volume and erythrocyte a count increased significantly in group with high concentration of garlic and our results were in agreement with findings of Al-sarraf ,) 1982) in male chicks injected sub cutanously with ethane extracted garlic in dose of 300 mg / kg body weight . al so , palany , (2000) in his study on rabbits given 1800 mg / kg body weight garlic was in agreement with us in all hematological parameters DLC effected by many factors including nutritional status when heterophil increases and lymphocyte decreased remarkable to stress by increased (heterophils to lmphocytes) ratio (MCFARLANE and CURTIS , 1989) . in one study the percent of lymphocyte was increased and hetrophils was decreased which improved the role of garlic as anti-stress according to (MCGOWEN , 1996).

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المستخلص

أجريت هذه الدراسة لمعرفة تأثير مستخلص الثوم المائي في الصورة الدموية لفروج اللحم والمتمثلة بعدد خلاياالدم الحمر وتركيز الهيموجلوبين الدم وحجم الخلايا المرصوصة والمعدل الترسيبي لخلايا الدم الحمر والعدد الكلي والعدد التفريقي لخلايا الدم البيض .

استخدم 120فرخا من فروج اللحم عرق فايبروهجين من مركز آباء للأبحاث الزراعية ,مشروع التربية المنزلية بعمر يوم واحد. قسمت الأفراخ بالتساوي إلى ثلاثة مجا ميع غذيت الأفراخ في المجاميع الثلاث على عليقه تجارية يوميا وعلى مدى 8 أسبوع لافراخ اللحم وجرعت الأفراخ في المجموعة الأولى G1 بمستخلص الثوم المائي ذو التركيز 50 % بمقدار (1) مل وجرعت المجموعة الثانية (G2) بـ (1) مل من مستخلص الثوم المائي ذو التركيز 25.% والمجموعة الثالثة مجموعة السيطرة التي لم تم تجريع الطيور فيها بمستخلص الثوم المائي في نهاية التجربة في الأسبوع الثامن من عمر الطير تم سحب الدم من الطير وقياس تعداد خلايا الدم الحمر وتركيز هيموجلوبين الدم وحجم الخلايا المرصوصة ومعدل ترسيب خلايا الدم الحمر والعدد الكلي للخلايا الدم البيض والعدد التفريقي لخلايا الدم البيض فكانت النتائج كما يلي :-

1-ارتفاع معنوي في عدد خلايا الدم الحمر في مجموعتي G1 و G2 مقارنة بمجموعة السيطرة .

2-أظهرت نتائج قياس تركيز هيموجلوبين الدم ارتفاع معنوي في مجموعة G1 مقارنة مع مجموعتي G2 والسيطرة اللتان لم يظهر فرق معنوي بينها .

3-ارتفاع معنوي في حجم الخلايا المرصوصة في مجموعة G1 مقارنة مع مجموعة السيطرة و G2 اللتان لوحظ فرق غير معنوي بينها .

4-ارتفاع معنوي في معدل ترسيب الخلايا الحمر مجموعة C مقارنة بالمجموعتين الأخيرتين0

5-لا توجد فر وقات معنوية بين المجا ميع في تعداد خلايا الدم البيض0

6-أشارت نتائج العد التفريقي لخلايا الدم البيض إلى ارتفاع معنوي في النسبة المئوية للخلايا اللمفية وانخفاض معنوي في النسبة المئوية للخلايا المتغايرة في مجموعة G1 مقارنة مع مجموعة السيطرة في الوقت الذي لا توجد فيه فروقات معنوية بين مجموعة G1وG2 كما لم تتاثر نسب إعداد الخلايا الأخرى المحمضة والقاعدية ووحيدة النواة بشكل معنوي في المجاميع الثلاثة.

تشير النتائج أعلاه إلى إن المستخلص الثوم المائي تأثير إيجابيا على الصورة الدموية في الدجاج اللحم بتركيز 50% واقل منه بتركيز 25%كذلك له تأثير زيادة الحالة المناعية الدفاعية للجسم بزيادة نسب إعداد الخلايا البيض اللمفية والتي لها دور فعال في المناعة الخلطية والخلوية .