Study of hematological and some biochemical values changing with administration of Salinomycin and Poultrystar probiotics in broiler chickens challenged with Cocciodsis (*Eimeria tenella*)

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Abstract

This study was aimed to investigate the effect of probiotics (Salinomycin and Poultrystar) on the challenger infection with *Eimeria Tenella* (coccidiosis) depending on 120 Lowman broiler chicks divided into three groups (G1: received Salinomycin 60 ppm; G2: Poultrystar 0.05% and G3: served as control group) and the following blood parameters were studied RBC (Red Blood Cell) count, Hb (Heamoglubin) concentration and PCV (Packed Cell Volume) concentration which were decreased significantly in treated groups ($P<0.05$) in a comparison with control group; WBC was increased significantly in treated groups in a comparison with control group; total protein and globulin were increased while albumin, total cholesterol and triglyceride were decreased significantly in treated groups when compare with control group. Conclusion: The addition of probiotics enforces the tolerance of body against the coccidian infestation incidence.

Introduction

Coccidiosis is one of the most parasitic diseases causes greatest economic impact in poultry industry and the control on it is very difficulty, so there were continual attempts to improve anti coccidian agents and a chemo – therapies (1) and even uses of live or attenuated vaccines (2). The treatment of this disease started with uses of compounds contain sulfur (3) and then sulphonamide compounds (4) and Amprolum which is active anti – coccidian (5), the term of " probiotic " has been used to indicate substances or microorganisms which contribute to an ideal microbial balance (6). Salinomycin is an antibiotic type monocarboxylic polyether ionophores (7) and has a bactericidal effect specially on gram positive bacteria in addition it effect on mycobacterium, fungi and eimeriosis (8), and a cidal effect on eimeria through first stages of life cycle (9), it derivative from *Streptomyces albus* (10), salinomycin interferes with some other antibiotics action (erythromycin, chloramphenicol …..etc) , and with protein absorption provided with ration (11). For this reason the present study comes to evaluate the effect of salinomycin and poultrystar probiotics addition in ration on the physiological and some biochemical parameters in broiler chickens infected experimentally with coccidian disease.

Materials and Methods

This study was designed depending on 120 Lowman broiler checks weighted 50 gm at the first day of age divided randomly and equally into three groups each group was housed in conditioned room (40 chicks in 3 m^{2}) and received a probiotc to the ration as follow; the checks of first group (G1) were received Salinomycin in dose of 60 PPM (8), second group (G2) administrated Poultrystar 0.05% , while the third group (G3) was served as a control group without anti - coccidian addition.

Challenge: At the 33rd day of age chicks were given orally 2 X 10^{4} mature egg of *Eimeria tenella* for each chicks as a challenge test. Blood samples collected from the jugular vein twice, first collection at 28th day of age (e.i. fife days prior challenging and the second was at 40th day

of age (e,i. seven days post challenging) and each sample divided into unequal two parts in heparin zed and non heparin zed).

Parameters:

Blood picture: involves RBCs count (cell X 10^{12} / L) and PCV (%) according to (12), Heamoglobin (Hb) concentration (gm/ dl) according to (13), and WBC count (cell X 10^{9} / L) .

Biochemical: Total protein (g / dl) Biuret method (14), Albumin, Globulin, Total cholesterol (mg/ dl) (15) and Triglyceride (mg / dl) according to (16).

Statistical analysis:

Data was statistical analyzed by complete random design (CRD) to study the effect of different treatments on the experimental parameters and comparing among means of groups at least significant differences (LSD), with a program SAS (17).

Result and discussion

Table (1) The effect of Salinomycin and poultrystar addition on the haematological parameters RBCs, Hb, PCV and WBC before and after challenging test (M ± S.E.)

RBC Cell X 10^{12} / L	G1 Salinomycin	G2 Poultrystar	G3 control
Before Challenge	Aa 4.8 ± 0.03	Aa 4.5 ± 0.08	Aa 4.3 ± 0.09
After Challenge	Ab 4.1 ± 0.04	Ab 2.8 ± 0.06	Bb 2.2 ± 0.03
Hb gm / dl			
Before Challenge	Aa 12.8 ± 0.13	Aa 12.8 ± 0.13	Aa 12.3 ± 0.29
After Challenge	Ab 11.6 ± 0.14	Bb 7.9 ± 0.09	Cb 6.2 ± 0.09
PCV %			
Before Challenge	Aa 30.1 ± 0.19	Aa 30.0 ± 0.5	Aa 30.43 ± 0.18
After Challenge	Ab 27.0 ± 0.11	Ab 26.0 ± 0.28	Bb 22.6 ± 0.2
WBC Cell X 10^{9} / L			
Before Challenge	Aa 16.0 ± 0.09	Aa 16.5 ± 0.09	Aa 15.9 ± 0.1
After Challenge	Ab 22.0 ± 0.08	Ab 20.0 ± 0.17	Bb 17.0 ± 0.34

Different capital letters refer to significant differences among groups in (P<0.05)
Different small letters refer to significant differences between before and after challenge in (P<0.05).

Data of table – 1 revealed that RBC, Hb and PCV were decreased significantly (P<0.05) in G1 and G2 in comparison with G3 after the challenger infection, and within each group there are significant differences (P<0.05). This decline in the blood components maybe due to the sever bleeding and tissue damage in the mucosa of duodenum originated from invasion of *Eimeria tenella* (18).Total WBC increased significantly (P<0.05) in blood of chicks of G1 and G2 in comparison with control group (G3), this elevation of total white blood cells due to increases in the polymorph nuclei number (neutrophil and eosinophil), the neutrophil infiltration increases immediately after any infection as a first defense line followed by increases in eosinophil concentration as a response to parasitic infestation (19).

Table (2) The effect of Salinomycin and poultrystar addition on the biochemical parameters total protein, albumin and globulin before and after challenging test (M ± S.E.)

Total protein gm / dl	G1 Salinomycin	G2 Poultrystar	G3 control
Before Challenge	Aa 4.13 ± 0.75	Aa 4.11 ± 0.74	Aa 4.12 ± 0.76
After Challenge	Ab 4.99 ± 0.43	Ab 4.96 ± 0.6	Bb 4.81 ± 0.48
Albumin gm / dl			
Before Challenge	Aa 1.72 ± 0.23	Aa 1.73 ± 0.22	Aa 1.74 ± 0.23
After Challenge	Ab 2.02 ± 0.48	Ab 2.43 ± 0.43	Bb 1.99 ± 0.34
Globulin gm / dl			
Before Challenge	Aa 2.36 ± 0.82	Aa 2.37 ± 0.84	Aa 2.38 ± 0.85
After Challenge	Ab 2.97 ± 1.26	Ab 2.53 ± 0.80	Bb 2.82 ± 0.71

Different capital letters refer to significant differences among groups in (P<0.05)
Different small letters refer to significant differences between before and after challenge in (P 0.05).

Table (2) show that there are significant increasing (P<0.05) in the sera total protein of chick of groups G1 & G2 in comparison with total protein concentration of control sera (G3), this increasing may explained by the elevation of globulin component as the antibodies formation against the invader agent (20), also the administration of probiotics to the chicken diet of G1 and G2 has a stimulant effect on gamma globulin elevation which will reflect positively on total protein concentration and give the significant differences (21). In the other hand the decreases of albumin concentration occurred in the sera of group one and group two in compared with group three was significantly(P<0.05), as a result of globulin constituents elevation to maintenance the blood osmotic pressure within normal limits (22).

Table (3) The effect of Salinomycin and poultrystar addition on the lipid profile triglyceride and cholesterol before and after challenging test (M ± S.E.)

Triglyceride mg / dl	G1 Salinomycin	G2 Poultrystar	G3 control
Before Challenge	Aa 78.74 ± 1.04	Aa 78.74 ± 1.04	Aa 78.47 ± 1.04
After Challenge	Ab 59.49 ± 0.87	Bb 64.24 ± 0.75	Cb 69.24 ± 0.75
Cholesterol mg / dl			
Before Challenge	Aa 135.01 ± 7.58	Aa 142.11 ± 10.65	Aa 142.44 ± 6.73
After Challenge	Ab 87.3 ± 6.5	Ab 86.5 ± 6.3	Bb 93.9 ± 5.9

Different capital letters refer to significant differences among groups in (P<0.05)
Different small letters refer to significant differences between before and after challenge in (P<0.05).

The concentrations of triglyceride (TG) and cholesterol in sera's of chicks of groups G1 and G2 were significantly lower ($P<0.05$) than of control group after challenge infection (table – 3) and when compared between two periods for each group showing a significant ($p<0.05$) decreases post treated, this decline may explain by the fact that suggest the administration of probiotic induced releasing of amino acids which stimulates the benefit microorganisms and causing of inhibition of Acetyl – CoA – carboxylase enzyme which inhibits in its turn the synthesis of fatty acids, this causes decreases in total lipids. Whereas the decreases of cholesterol concentration may due to inhibition of 3 – hydroxyl – 3, ethyl glutaryl co enzyme reductase (HMG – CoA) which it the limit enzyme of cholesterol synthesis (23).In the same table (3) there is a significant decreases ($P<0.05$) in the serum of control group between the two periods, the decreases is because sever damage taken placed in the intestinal mucosa (chylomicrones assembled in intestinal mucosa cells and carry dietary triglyceride and cholesterol) by invader protozoon *Eimeria tenella* (24).

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دراسة التغيرات الحاصلة في القيم الدموية و الكيموحيوية عند اعطاء المعززات الحيوية (Salinomycine and Poultrystar) في افراخ اللحم المخمجة تجريبيا بداء الاكريات (*Eimeria tenella*)

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الخلاصة

هدفت هذه الدراسة الى التحقق من تاثير اضافة المضادات الحيوية الى العليقة عند اصابة الافراخ تجريبيا بداء الاكريات *Eimeria tenella* 120 فرخة من نوع لومان وزعت عشوائيا على ثلاث مجاميع متساوية بالعدد (40 فرخ لكل مجموعة) المجموعة الاولى (G1) اعطيت عقار الساينومايسين بجرعة 60 جزء من المليون مع العليقة ، اما المجموعة الثانية (G2) اعطيت عقار poultrystar بتركيز 0.05% بالعليقة، وتركت المجموعة الثالثة (G3) كمجموعة سيطرة. تم تجريع افراخ التجربة فمويا بالكامل بجرعة التحدي لداء الاكريات بعمر 33 يوم اذ جرع كل فرخ بـــ 20000 بيضة ناضجة لاحداث اصابة تجريبية. سحب الدم من الوريد الوداجي للطيور مرتين الاول بعمر 28 يوم (خمسة يوم قبل الاصابة) و السحبة الثانية كانت بعمر 40 يوم (اي بعد سبعة ايام من جرعة التحدي) ودرست المعايير الدموية التالية: عدد كريات الدم الحمر و تركيز خضاب الدم و حجم خلايا الدم المرصوصة اذ اظهرت نتائج التجربة انخفاض معنوي ($P<0.05$) في المعايير اعلاه في دم طيور المجموعة الاولى و الثانية بالمقارنة مع مجموعة السيطرة، ولوحظ ارتفاع في العدد الكلي لخلايا الدم البيضاء في دم المجاميع المعاملة بالمقارنة مع السيطرة. اما بالنسبة الى المعايير الكيموحيوية فقد وجد ارتفاع معنوي في تركيز البروتين الكلي و الكلوبيلين وانخفاض في تركيز الالبومين بشكل معنوي في مصل افراخ مجموعتي المعاملة بالمقارنة مع المجموعة الثالثة (السيطرة)، ولوحظ ايضا انخفاض معنوي في التركيز الكلي للكولسترول و ثلاثي الكليسيريد في مصل المجموعة الاولى و الثانية بالمقارنة مع المجموعة الثالثة. ومن هذا نستنتج ان اضافة المعززات الحيوية تقلل من حدة الاصابة المرضية بداء الاكريات.