The influence of enrofloxacin on hematological features, total cholesterol, blood glucose and body weight of broilers

A. A. Aziz
Colle. of Vet. Med. Univ. of Al-Qadissyia

Abstract

The effect of enrofloxacin on hematology and some parameters of blood biochemistry of broilers were investigated. A total of 50 day old commercial broiler chicks were raised and distributed into two equal groups, group A treated with enrofloxacin and group B designed as a control.Enrofloxacin was used for group A for five consecutive days via drinking water (double dose 1ml/litter) at the 21 days of life, ten birds from each group were slaughtered at 27 days post treatment, hematological examinations were performed, serum total cholesterol and blood glucose were analyzed by using special enzymatic kits for that purpose, body weight was considered at 32 days of life for five samples. Changes in Hb,PCV,RBC,WBC,MCV,MCH,MCHC,Total cholesterol, blood glucose, and body weight were observed, the investigation demonstrated all these hematological parameters were with out divers effect due to enrofloxacin treatment comparing to control, and showed that the enrofloxacin have no effect on total cholesterol , blood sugar or body weight comparing to control.

Introduction

Avian blood differ in cells characteristics from their mammalian counterpart (1),several factors including water and feed restriction (2,3),diet content(3), environmental conditions (4),age(5), continuous supplementation of Vit.E (6),and poultry diseases (7) ,affect the hematology of birds. Antibiotics are used in the commercial flocks to treat diseases, growth promoters and increased feed efficiency (8).However certain antibiotic recently have been shown to exert diverse effect on different elements of the blood, some agents are known to cause leucopoenia such as beta lactam and trimethoprim-sulfamethaxazole, or pancytopenia and toxic effect on the intestinal mucosa in case of chloramphinicol treatment (9, 10,11), or toxic effects of furazolidone on blood profiles (12),enrofloxacin with prolonged duration of treatment may cause elevation in the liver enzymes such as serum glutamic acid pyrovic transaminase (SGPT)and serum glutamic acid oxaloacetate transaminase (SGOT) , may be due to the adverse effect on tissue of the liver (13), although antibiotics are often prescribed for treatment and growth promoters reports on it's side effects are present. Enrofloxacin is a quinolone carboxylic acid derivative with antimicrobial action against gram positive and gram negative organisms, highest concentration occurred in liver and kidney , following a one-day withdrawal in poultry the highest drug concentration were found in the skin(14), its action increases double-strand (DNA) breakage, inhibits relaxation of supercoild (packed) DNA needed for DNA replication, inhibit the A subunit of DNA gyrase for this reason its activity was bactericidal (15,16), there was no evidence for carcinogenicity (17), enrofloxacin has been claimed to be an effective antibacterial agent and basically used in Veterinary Medicine for the treatment of diseases, caused by *E coli, Salmonella* and strains of *Mycoplsma gallisepticum, Hemophilus spp*. as well as chronic respiratory disease. (18).The purpose of this research was to investigate the hematological parameters, total cholesterol, blood glucose and body weight performance offer treatment with enrofloxacin which is frequently

prescribed for birds on the course of infection.

Materials and Methods

A total of 50 one day old broiler chicks obtained from commercial hatchery were used in this study .the birds were distributed randomly into two equal test groups, group A treated with enrofloxacin and group B designed as control.Group A was treated with double dose 1ml/litter (Enrofloxacin10%) via drinking water at 21 days for 5 consecutive days ,blood samples were taken from each group at 27 days of age after the duration of treatment, 10 birds have been taken randomly from each group and bled by incision of the jugular vein .An constricted blood flow was allowed to accumulate to plastic tubes with and with out EDTA for hematological studies and for collection the serum.The hematological examination carried out on the 5 unclotted blood samples were included estimation of packed cell volume(PCV) to evaluate the status of avian erythron ,the hemoglobin concentration (Hb),red blood cell count (RBC),white blood cell count (WBC) ,the mean values of these five samples were considered and from these were calculated the mean cell volume (MCV), the mean cell hemoglobin (MCH), the mean cell hemoglobin concentration (MCHC), these values are important in determining the morphological characteristics of anemia. (19).The collected serum10 samples were examined for total cholesterol and blood glucose by using spectrophotometer(PD-303,APEL,Japan) and special enzymatic kits (cholesterol SL(CHOD-PAP),wave length 510 nm , and Glucose SL (GOD-POD),wave length 500 nm,Giesse Diagnostic Snc , Italy) .5 birds were weigh on day 32 of age . Antibiotics and enrofloxacin treatment was similar to regimen used in commercial chicken production, routine vaccination of Newcastle disease ND and Infectious bursal disease IBD, the diet was standard, the chickens were reared at standard condition.Statistical analysis, all data were subjected to ANOVA –test.

Results and Discussion

The hematological values, serum total cholesterol, blood glucose and body weight gain were determined on the birds treated at the 21days of age with enrofloxacin which are shown in Table 1and 2.These results display the hematological values were numerically decrease of Hb,PCV, RBCs, WBCs, MCV, MCH, MCHC of treated group in comparison with that of control group but the differences were not significant, these hematological values were closely related with that of normal ranges mentioned by (20,5), we suggest that enrofloxacin does not cause anemia, since anemia is commonly defined as hematocrit value of less than 27%in birds (21), of any type macrocytic or microcytic anemia since that MCV with normal range . RBCs count of treated group is ranging with normal values, this making us to say that the enrofloxacin has no effect on bone marrow or spleen.WBCs count showed numerical differences but not significant of comparable two groups, in the treated group there is a little decline in the WBCs count this may be due to the way which enrofloxacin affect the bacteria through impair the gyrase ,an enzyme which plays a major role in the replication of DNA(22), its not quite sure if with long term or high doses treatment with enrofloxacin will cause decrease in immune response by reducing total WBCs count in blood, although the humeral immune response following vaccination using as an example, Newcastle disease antibodies were not reduced by treatment with enrofloxacin (Baytril)(23).Serum total cholesterol and blood glucose showed low levels of treated group in comparison with the control, but did not differ significantly.These results are true for laboratory animals that give therapeutic level which did not reveal any significant effect on blood cholesterol ,triglyceride and sugar (24),but (13) found that long term treatment with enrofloxacin caused a significant decline in the cholesterol level of the broilers serum at 4,6,8 weeks of age .Weight gain of the treated group was at the same time not

better than control group, there is no influence on feed conversion by enrofloxacin comparing two groups, this result does not match with results obtained by Bauditz (25) who found that the enrofloxacin enhances the body weight by 7.8% compared with control.These data demonstrate here revealed these values under investigation of hematology are analogue with the normal range of both groups, may be these results indicate that the enrofloxacin has no adverse effects on hematological values,there is no influence on erythron status or evidence of anemia, since that the PCV,Hb,RBCs with normal range at one single age in chickens of 21 days old treated with double dose of enrofloxacin ,we suggest this is may be due to the complete development of haemopoitic system of chickens and so we thought the use of enrofloxacin at the beginning of life may had an influence on the hematology, since the haemopoitic system is not developed yet, and this need to investigate to confirmed and whether this effect is temporary or prominent, also it is not well known if high doses or long term treatment will affect the hematology of older birds .The use of enrofloxacin does not cause changes in the total cholesterol or blood sugar, this may be due to that enrofloxacin has no or little effect on the liver, although the highest concentration of enrofloxacin in this organ (26), or may be due to that the enrofloxacin did not affect the absorption of nutrients and fats in the diet , may be due to that enrofloxacin has no or little toxic effect on intestine.The enrofloxacin has no effects on the body weight therefor we considered that enrofloxacin is not enhancing growth or feed conversion and can not use as growth promoter.These data were showed here it is restricted by the bird age, dose and duration of treatment, nutrition, health status and environment.

Table(1) Represent the hematological values

Group	Hbg/dl	PCV%	RBC 10^6/mm3	WBC 10^3/mm3	MCV fl	MCH pg	MCHCg/dl
A	10.2(0.94)a	30.38(1.13)	2.49(0.12)	21.86(0.3)	120.8(3.37)	40.8(0.9)	33.74(0.89)
B	10.6(0.5)a	31.18(0.87)	2.55(0.15)	22.40(0.46)	121.06(3,55)	41.1(0.64)	33.96(0.8)

Data are means of 5 samples for each parameter analyzed, a: standard deviation A: treated group , B:control

Table(2) Represent the biochemical values and body weight

Group	Glucose Mg/dl	Total cholesterol Mg/dl	Weight gm
A	76.1(8.049)a	159.1(18.458)	882*(62.417)
B	86.07(10.312)a	165.6(17.267)	^74(54.198)

Data are means of 10 samples for each parameter analyzed,*: five samples, a: standard deviation A: treated group , B:control

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تأثير مركب الانروفلوكساسين في الصورة الدموية، الكوليسترول الكلي، كلوكوز الدم ووزن الجسم في أفراخ اللحم

د.علاء عبد العزيز
كلية الطب البيطري / جامعة القادسية

الخلاصة

درس في هذا البحث تأثير مركب الانروفلوكساسين على الصورة الدموية وبعض المعايير الكيمياحيوية للدم في فروج اللحم. تضمنت التجربة التي صممت لهذا البحث تربية (٥٠) فرخه لحم حيث قسمت إلى مجموعتين، المجموعة الأولى Aتمت معالجتها بمركب الانروفلوكساسين والمجموعة الثانيةB عدت مجموعة سيطرة. استخدم الانروفلوكساسين في المجموعة A بعمر ٢١يوم ولمدة خمسة أيام متتالية عن طريق ماء الشرب بجرعة مضاعفة مقدارها 1مل/لتر.اخذت عشرة طيور من كل مجموعة وبعمر ٢٧يوم بعد تقديم العلاج حيث جمع الدم من كل طير واجريت فحوصات الدم على خمسة عينات ولكل من حجم الخلايا المرصوصةPCV و الهيموكلوبين Hb وعدد كريات الدم الحمراء RBCs و عدد كريات الدم البيضاءBCs ومعدل حجم الكريات MCV و معدل هيموكلوبين الكريات MCHوأخيرا معدل تركيز هيموكلوبين الكرياتMCHC، كما واستحصل على المصل ولعشرة عينات لغرض إجراء فحص مستوى الكولسترول الكلي و كلوكوز الدم وكذلك سجل وزن الجسم بعمر ٣٢يوم لخمس عينات من كل مجموعة .أظهرت نتائج هذا البحث عدم وجود أي تأثير في معايير الدم المفحوصة في هذا البحث للمجموعة المعالجة بمركب الانروفلوكساسين مقارنة مع مجموعة السيطرة وكذلك أظهرت النتائج عدم وجود أي تغييرات في مستوى الكولسترول الكلي وكلوكوز الدم لمجموعة المعالجة مقارنة بمجموعة السيطرة، وكذلك لم يؤدي استخدام مركب الانروفلوكساسين إلى تحسن أو زيادة في النمو .