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Impact of a single dose of Doramectin on Hematological and Biochemical parameters in goats

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Abstract: The present study was conducted to evaluate the effect of a single dose of doramectin a number of hematological and biochemical parameters in goats. Twenty goats were equally divided into two groups, each of 10 goats. The control group was kept without any medication. While, the treated group received a single dose of doramectin at a dose level of 1 ml per 33kg of body weight subcutaneously after two and four weeks form the beginning of drug administration blood samples were collected via the jugular vein from the control and treated groups. The results demonstrated that red blood cell (RBC) counts, hemoglobin concentration (Hb %) and White blood cell (WBC) counts were significantly ($p<0.05$) decreased in treated groups at weeks 2nd and 4th weeks as compared to the control group. While serum levels of albumin were significantly ($p<0.05$) increased in treated goats in comparison with the control at 2nd and 4th weeks of the experiment. However, there were non-significant changes in packed cell volume (PCV%), globulin and total protein levels in the treated group as compared with the control at all the experiment period. Thus, the therapeutic dose of doramectin can induce minor changes in some blood parameters in goats. packed cell volume (PCV%) was changed with non-significant at week 2 and week 4 in the treated group compression to the control group. White blood cell (WBC) counts decreased in all groups treated from the onset to the end change in both the time treated goats at 2 and 4 weeks compared with the control group. Thus, the therapeutic dose of doramectin can induce minor changes in some blood parameters in goats.

Keywords: Doramectin, hematological, some biochemical parameters.

تأثير جرعة واحده من الدورامكتين على المعايير الدموية والبيوكيميائية في الماعز

المستخلص: الدورامكتين هو عقار مضاد للطفيليات الداخلية والخارجية ويستخدم في الحقل البيطري على نطاق واسع للقضاء على الديدان الداخلية والطفيليات الخارجية في اغلب الحيوانات المزرعة. قمنا بأجراء هذه الدراسة لمعرفة تأثير الجرعة العلاجية على بعض المعايير الدموية والبيوكيميائية في الماعز خلال اسبوعين ثم اربعة اسابيع من المعالجة بهذا العقار. وخلال التجربة تم استخدام عدد عشرين من الماعز بأوزان من 25 الى 35 كجم وبعمر ما بين سنة الى سنتين وقسمت بالتساوي الى مجموعتين كل مجموعة تحتوي على عدد عشرة من الماعز اخذت المجموعة المعالجة جرعة واحدة من عقار الدورامكتين بمعدل 1مل لكل 33 كجم وزن جسم تحت الجلد في حين لم تتلقى المجموعة الاخرى اي جرعة ووضعت كمجوعة ضابطة وتم جمع عينات الدم من الوريد الوداجي بعد اسبوعين وأربع اسابيع من بداية التجربة. اظهرت النتائج الدموية بان هنالك تغيرات ملحوظة متمثلة في انخفاض عدد الخلايا الدم الحمراء وتركيز الهيموجلوبين في المجاميع المعالجة عند الاسبوع الثاني والرابع من التجربة مقارنة بالمجموعة الضابطة أما بالنسبة لحجم الخلايا المرصوصة حدث تغير غير معنوي عند الأسبوع الثاني والرابع من التجربة مقارنة بالمجموعة الضابطة وايضا لوحظ انخفاض في اعداد الخلايا الدم البيضاء في المجموعة المعالجة من بداية التجربة والى نهاية التجربة مقارنة بالمجموعة الضابطة أما بالنسبة للتغيرات البيوكيميائية فقد لوحظ ارتفاع في مستوى الالبومين معنويا عند الأسبوع الثاني والرابع من التجربة مقارنة بالمجموعة الضابطة ولم يكن هنالك تغير معنوي في مستويات البروتين الكلي والجلوبيولين في المجموعة المعالجة في الاسبوع الثاني والرابع من التجربة مقارنة بالمجموعة الضابطة. ويستخلص من هذه الدراسة ان إعطاء الدورامكتين كجرعة علاجية في الماعز أدى الى حدوث تغيرات طفيفة في الدم ونحن نوصى بالتقيد بإعطائه جرعة واحدة في الشهر وعلى حسب وزن الحيوان.

الكلمات المفتاحية: الدورامكتين، الهيموجلوبين، الالبومين، الدم.

INTRODUCTION

Doramectin is an effective drug against the main gastrointestinal and pulmonary parasitic roundworms, such as *Dictocaulus spp., Haemouchus spp., Cooperia spp., Ostertagia spp.*, and *Trichostrongylus spp*. Additionally, multiple myiasis (caused by screwworm, bot, and warble flies) (Anchordoquy et al., 2019). A previous article stated that the most often used anti-parasitic medications in the veterinary profession are macro lactones, specifically avermectins, which have fundamentally changed procedures aimed at controlling parasites and have annual sales exceeding one billion US dollars (Salman et al., 2022). The effects of eprinomectin and ivermectin on *Triatoma infestans* blood supply behaviour. (Dadé et al., 2017).

The adverse effects of the three insecticides in the study have been shown through prior studies. An interesting supplement tactic to the use of pyrethroids for the management of *Triatoma infestans* is the recorded administration of ecto|endoparsiticides to domiciliary or peridomicilliary animals. (Dadé et al., 2017). According to a tudy doramectin, antiparasitic effect results from inhibition of gamma-aminobutyric acid (GABA) neurotransmission. (de Souza Spinosa et al., 2000). Anxious and seizures constitute two behavioral manifestations that may be related to GABA-ergic neurotransmission. Similar to anxiolytic drugs, rats administered Doramectin (100,300 and 1000 ug \kg,S\C) had no effect on their capacity to move around or rear, although the amount of head dipping increased enhanced. (Santos et al., 2017).
In the plus-maze test, doramectin recoded that *Psoroptes ovis* and *Leporacarus gibbus* could be effectively controlled with a single oral dosage of 200µg/kg (Santos et al., 2017) A semi-synthetic macrocyclic lactone called doramectin is derived from the fermentation byproducts of soil microbes such as *Streptomyces avermitilis*. Its characteristics are fairly comparable to those of ivermectin (Bowman, 2004). High efficacy against a broad range of internal and exterior parasites is a hallmark of *avermectins*. They are generally highly safe medications for use in mammals due to their manner of action (Courtney & Roberson, 2001). It is also active against most mites, ticks, lice species and against *numeous myiasis* (e.j those caused by screw worm flies, bot flies and warble flies). However, the commonly used anti-parasitic drugs cause many side effects on the different organs of treated animals, such as transient irreversible neuromuscular blockade and hypertension (El-sawy, 1983; Rosseff.,1974). The aim of this study is to evaluate the effect on a number of hematological and biochemical of the single dose of doramectin (1ml/33kg b.w. s.c) administered subcutaneously to goats.

MATERIALS AND METHODS

Doramectin

(Doramax)®1% is an injectable solution produced by Vemedim Company. Each milliliter contains 10mg/ml. All the diagnostic kits used for assaying the hepatic (total serum protein, serum albumin and globulin were obtained from Bio-diagnostic Company, Egypt. Other chemicals for hematological studies (RBCs and WBCs counts, hemoglobin percentage and packed cell volume value tests) were performed by an automatic blood cell analyzer (XP-300). (Automated Hematology Analyzer, Sysmex American).

Experimental design

Animals

Twenty goats aged 1-2 years old (average body weight 25-35 kg) were obtained from Bodloma farm. The animals were kept under standard conditions inside the barn for 2 weeks and ensured free from any infection. They had no limitations to drinkable water and often –scheduled foods.

First group: control group (no any treatment was used).

Second group: injected doramectin (1ml/ 33 kg. b. w. s c.) a single dose. The blood samples were collected from all animals at the second and fourth weeks for hematological and some biochemical parameters.

Statistical analysis

The data were analyzed by using independent samples T- test. There were two groups, first group was the control group and second group was ZONPs treated group. Data were analyzed by using SPSS, 23. The significant effect was set at ($P < 0.05$). Data were presented as mean ± standard error.

RESULTS

Hematological findings

The results showed that red blood cell (RBC) counts, hemoglobin concentration (Hb %) and White blood cell (WBC) counts were significantly ($p<0.05$) decreased in treated groups at 2nd and 4th weeks as compared to the control group. However, Packed cell volume (PCV%) showed non-significant changes at 2nd and 4th weeks as compared to control throughout the experiment period.

Biochemical findings

The results demonstrated that serum levels of albumin were significantly ($p<0.05$) increased in the treated goats compared with the control at 2nd and 4th weeks of the experiment. However, there were non-significant changes in globulin and total protein levels in the treated group as compared with the control throughout the experiment period.

Table:(1). The effect of doramectin (1ml/33kg .b. w .s. c) on hematological at 2 and 4 weeks in goats from drug administration compared to control (Mean ± SEM).

Parameters	Control (Mean ± SEM)	After2 week (Mean ± SEM)	After4 week (Mean ± SEM)
PCV(%)	35.50± 02.10	35.48± 02.00	35.29± 02.00
Hb (g/dl)	12.06± 00.26	11.02± 00.22*	11.80± 00.20*
RBCs ($X10^6$/µL)	8.60± 0.50	7.30± 0.20*	7.90± 0.10*
WBCs (10^3/µL)	8.80± 0.75	7.20± 0.60*	7.80± 0.80*

*Mean with different superscripts between rows refer to significant ($p<0.05$).

Table:(2). The effect of doramectin (1ml/33kg .b. w. s.c) on levels of total protein, albumin and globulin at 2 and 4 weeks in goats after drug administration compared to control (Mean ± SEM).

Parameters	**Control (Mean ± SEM)**	**After2 week (Mean ± SEM)**	**After4 week (Mean ± SEM)**
Total protein (g/dl)	8.20± 00.55	8.15± 00.40	**7.96± 00.32**
Albumin (g/dl)	3.80± 00.31	4.01± 00.40*	**3.90± 00.40****
Globulin (g/dl)	4.17± 00.50	4.15± 00.35	**4.00± 00.20**

*Mean with different superscripts between rows refer to significant ($p<0.05$).

DISCUSSION

Avermectins are considered very safe drugs in ruminants. (Sas, 2002). The aim of the current investigation was to evaluate the impact of a therapeutic dosage of doramectin on a number of hematological and biochemical parameters in goats. Prior to the trial, the majority of the goats' hematological and biochemical parameters were within normal physiological ranges. Various studies have different normal values (Jazbec, 1990 ; Kaneko, 1997). The results obtained aligned with the study, which found doramectin reduced trends in hemoglobin, red blood cells, and platelet count relative to pre-experiment values (Zhang et al., 2019). Moreover, the results obtained on W.B.C, counts in treated goats showed a decreased in W.B.C counts, at 2nd and 4th weeks of the experiment. The obtained results are compatible with those reported. (Jadhav et al., 2017). where they found that the

hematology of bullock drenched with 200 ml. of the anthelmentics suspension of oxyclozanide in combination with levamisole revealed severe leukocytosis (19.20 x 10^9 /L), lymphocytosis (9.80 x 10^9/L), neutrophilia (8.70 x 10^9/L) and thrombocytopenia (28 x10^9 /L). The same study also noted that leukocytosis with neutrophilia, lymphocytosis, and thrombocytopenia were found in the hematology (Jadhav et al., 2017). Clinical recovery began on the second day of treatment due to the combination of one slow acting and one rapid acting compound; however, five days of treatment were needed for full recovery. Thus, supportive care and patient observation may be used to treat such cases of concurrent anthelmentics poisoning in farm animals. The hemato-biochemical investigation results are consistent with those published by (Shrimali et al., 2016), Researchers noticed that the groups treated with anthelmintic showed significantly increased hemoglobin, total erythrocyte counts, pack cell volume and total protein compared with the control group.

CONCLUSION

It could be concluded that therapeutic dose of doramectin in goats can induce minor changes in blood, we recommend administering a single dose during the mouth and according to the weight of the animal.

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