

Haematological Profile of Dogs, Treated with Diminazene Aceturate Alone and Diminazene Plus Oxytetracycline, Long Acting

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Abstract

For haematological profile of dogs treated with Diminazene aceturate (DA) alone and those treated with DA plus Oxytetracycline long acting (Oxytet LA), fourteen apparently healthy Nigerian indigenous dogs were assigned into two groups of seven dogs each. Blood samples were collected at different time intervals post treatment: 0, 1, 3, 6, 9, 12, 24, 36 and 48 hours. Means of PCV ($26.63 \pm 0.81^a/23.44 \pm 0.69^b$), Hb ($9.15 \pm 0.31^a/8.09 \pm 0.20^b$), TRBC ($4.10 \pm 0.16^a/3.70 \pm 0.15^b$), Neutrophils ($78.37 \pm 1.05^a/75.00 \pm 0.66^b$) and Eosinophils ($3.19 \pm 0.28^a/1.89 \pm 0.16^b$) were significantly ($P \leq 0.05$) higher in the group treated with DA alone than in the group treated with DA and Oxytet LA but means of the immune cells, Lymphocytes ($21.11 \pm 0.66^a/16.96 \pm 1.19^b$) and Monocytes ($2.00 \pm 0.18^a/1.04 \pm 0.16^b$) were significantly higher ($P \leq 0.05$) in the group treated with DA and Oxytet LA than in the DA-alone group.

Keywords: Haematological Profile; Diminazene Aceturate; Oxytetracycline Long Acting; Dogs

Introduction

Nigerian indigenous dog is a breed native to Nigeria and are popularly referred to as "Mongrels" by indigenes. They are long-headed (dolichocephalic) domesticated dogs, with their feeding pattern being mainly omnivorous as a result of the increased level of domestication [1]. Presently, there are increasing numbers of this breed of dogs in Nigeria perhaps due to their resistance to certain haemoparasitic diseases such as canine babesiosis and trypanosomosis that constantly affect exotic breeds [2].

Diminazene aceturate (Berenil) has been the drug of choice for treatment of animal trypanosomosis since 1955. It is an aromatic diamidine consisting of two amidinophenyl moieties linked by a triazine bridge [3].

Oxytetracycline long acting, a tetracycline derivative obtained from *Streptomyces rimosus*, is a broad-spectrum antibiotic used

against a variety of pathogens, including bacteria, mycoplasma, rickettsia, chlamydiae and even some protozoa [4].

Haematological parameters are those parameters that are related to the blood and blood forming organs [5]. Blood acts as a pathological reflector of the status of exposed animals to toxicant and other conditions [6]. Haematological profiles of dogs are essential in the diagnosis and monitoring of systemic diseases in Veterinary Medicine [7]. The examination of blood gives the opportunity to investigate the presence of several metabolites and other constituents in the body of animals and it plays a vital role in the physiological, nutrition and pathological status of an organism [8,9]. Due to the effects of several factors such as stress, age, sex, breeds, seasonal variations, climate, nutrition, treatments, housing and management system on the haematological parameters, changes in haematological parameters can thus be used to evaluate the effect of stressors and the deviation of an animal from the

normal to the stress state [8], the evaluation of the nutritional state and the welfare of animals [10-12].

Some works had reported the haematology of the Nigeria local dog [2,13-16]. However, there is paucity of information on the effects of diminazene aceturate (DA) alone and its combination with oxytetracycline long acting (oxytet LA) on the haematological profile of the Nigerian local dog. Since these two drugs are mostly used concomitantly in the treatment of typanosomosis in dogs and owing to the toxic effects they often produce in dogs, this work is designed to study the haematological picture of dogs treated with DA alone and its combination with oxytet LA.

Materials and Methods

Fourteen apparently healthy male Nigerian indigenous dogs aged between 4 to 6 months identified morphologically were used in this study. The dogs were presented to the Veterinary Teaching Hospital Michael Okpara University of Agriculture, Umudike, Abia state, Nigeria for clinical assessment of health and vaccination. This study was approved by the University of Agriculture, Makurdi Research and Ethics Committee. The study was conducted according to international guidelines [17]. Routine medical examination including haemoparasite screening was conducted on all dogs before sampling. Only clinically healthy dogs were sampled. Dogs having haemoparasites and external parasites were excluded. It was ensured that the dogs were calm prior to sampling. Age, sex, body weight, vital parameters and generalized body condition of the animals were assessed. For determination of haematological parameters, Diminazene aceturate was administered to group one through the left femoral vein at the rate of 3.5mg/kg body weight using 7% solution. Blood samples were obtained from the right femoral vein. Oxytetracycline long acting was administered to group two at the right gluteal muscle deep intramuscularly at the rate of 20mg/kg body weight, ten minutes after administration of diminazene aceturate (3.5mg/kg body weight), blood samples were obtained from the right femoral vein. Blood sample (1 ml) was collected from the femoral vein of each dog using 23G needle and syringe. The blood sample was collected at different time intervals such as 0, 1, 3, 6, 9, 12, 24, 36 and 48 hours and each was dispensed into a tube containing ethylene diamine tetra acetic acid (EDTA) as an anticoagulant. All blood samples collected were analysed within ten minutes after collection. Red blood cell (RBC) counts were determined using a haemocytometer. The packed cell volume (PCV) was estimated by the micro haematocrit method and haemoglobin (Hb) concentration by the cyanmethaemoglobin method. The mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calcu-

lated as described by Coles [18] and Esiebo [16, 19].

Statistical analysis

The data collected were analysed using SPSS version 20 statistical package. All data were expressed as Means \pm Standard Error of Means (S.E.M). Students 't' test was used to compare the two groups which are DA alone and DA plus oxytet LA. Least significant difference was dictated at 5% significance level.

Results

Mean-PCV (26.63 \pm 0.81a), HB (9.15 \pm 0.13a), TRBC (4.10 \pm 0.16a), Neutrophils (78.37 \pm 1.05a) and Eosinophil (3.19 \pm 0.16a) of the group treated with DA alone were significantly ($P \leq 0.05$) higher than 23.44 \pm 0.69b, 8.09 \pm 0.29b, 3.70 \pm 0.15b, 75.00 \pm 0.66b and 1.89 \pm 0.18b of the group treated with DA plus Oxytet LA respectively but mean- Lymphocytes (21.11 \pm 0.61a) and Monocytes (2.00 \pm 0.18a) of the group of DA plus Oxytet LA were significantly ($P \leq 0.05$) higher than 16.96 \pm 1.19b and 1.04 \pm 0.16b of the DA alone-group respectively while there were no significant differences ($P \geq 0.05$) in means of WBC (2.83 \pm 0.28a & 3.40 \pm 0.26a), MCV (62.11 \pm 0.73a & 64.26 \pm 1.08a), MCH (21.33 \pm 0.35a & 22.30 \pm 0.52a), MCHC (34.33 \pm 2.19a & 34.78 \pm 0.04a) and Basophils (0.07 \pm 0.03a & 0.00 \pm 0.00a) between the two groups, see (Table 1).

Haematological parameter	DA	DA+LA
PCV	26.63 \pm 0.81 ^a	23.44 \pm 0.69 ^b
Hb	9.15 \pm 0.31 ^a	8.09 \pm 0.20 ^b
TRBC	4.10 \pm 0.16 ^a	3.70 \pm 0.15 ^b
WBC	2.83 \pm 0.28 ^a	3.40 \pm 0.26 ^a
MCV	62.11 \pm 0.73 ^a	64.26 \pm 1.08 ^a
MCH	21.33 \pm 0.35 ^a	22.30 \pm 0.52 ^a
MCHC	34.33 \pm 2.19 ^a	34.78 \pm 0.40 ^a
Neutrophils	78.37 \pm 1.05 ^a	75.00 \pm 0.66 ^b
Lymphocytes	16.96 \pm 1.19 ^b	21.11 \pm 0.66 ^a
Eosinophils	3.19 \pm 0.28 ^a	1.89 \pm 0.16 ^b
Monocytes	1.04 \pm 0.16 ^b	2.00 \pm 0.18 ^a
Basophils	0.07 \pm 0.05 ^a	0.00 \pm 0.00 ^a

Table 1: Haematological parameters of dogs treated with Diminazene aceturate alone and with Diminazene aceturate plus long acting Oxytetracycline.

PCV - Packed cell volume, Hb - Haemoglobin, RBC - Red blood cell count, MCV - Mean corpuscular volume, MCHC - Mean corpuscular haemoglobin volume, WBC - Total white blood cell count. Where ^a = $P < 0.05$ is significantly higher, ^b = $P < 0.05$ and where there is a on both groups = $P > 0.05$; indicates not significant ($P > 0.05$).

Discussion

Compared to reference values/range for Nigerian indigenous dogs haemoglobin concentration (Hb), packed cell volume (PCV) and total red blood cell count (TRBC) decreased significantly in dogs treated with DA plus oxytetracycline long acting and were below the lower reference values [15,16] but TRBC was still within the lower reference range though lower than the mean of the group that was not treated with Oxyt-LA. This suggests that concurrent treatment of sick dogs with DA and oxytet LA may worsen anaemia (regenerative). Such condition of regenerative anaemia could lead to inadequate tissue oxygenation and anaemia [20-23].

Diminazine aceturate is the drug of choice for treatment of canine trypanosmosis in Nigeria [3]. The drug is also often supported with antibiotics to treat secondary bacterial infections because trypanosmosis is associated with immune deficiency [24]. Most clinicians prefer Oxytetracycline long acting to Oxyt-short acting because of its (Oxytet LA) broad spectrum activity, relatively lower cost [4] and the convenience of treating once in three days instead of daily treatment. However, results of this study appear/suggest worsening of anaemia as a side effect of such concurrent treatment of dogs with DA plus Oxytet LA.

We therefore suggest that whenever dogs are to be treated with DA and Oxytet LA supportive treatments including haematinics (blood products) should be included in the protocol in order to maintain Hb concentration and PCV within normal limits.

There was no significant differences in the means of WBC, MCV, MCH and MCHC between the two groups and their values were within the reference range for Nigerian indigenous dogs [16] and White blood cells counts and its differentials are measures of immunity. The cells fight infections to defend the body by phagocytosis and they produce or at least transport and distribute antibodies. Animals with low white blood cells are exposed to high risk of disease infections [25]. So, the results show that use of diminazene aceturate alone or in combination with oxytetracycline long acting may not on their own cause immune deficiency. However, it is suggested that immune boosters be given to dogs undergoing treatment.

There were significant increases ($p < 0.05$) in neutrophils and eosinophils in the group treated with DA alone when compared with reference values and the group of dogs treated with DA plus oxytet LA. Neutrophilia is usually caused by inflammation while

Eosinophilia suggests allergy [26]. The results therefore suggest that treatment with DA alone causes more inflammatory reactions and allergic reactions in dogs than combining it with oxytet LA. Again, supporting the treatment with antioxidant is suggested.

Conclusion

Haematological parameters and its knowledge can be used to assess the health, study the effects of drugs as well as the physiological status of animals under treatment. From this study we recommend that the use of Diminazene aceturate to treat dogs, either alone or concurrently with Oxytetracycline (long acting) should be supported with haematinics and antioxidants.

Conflict of Interest

There is no conflict of interest among the authors.

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