Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

European Journal of Experimental Biology, 2013, 3(4):1-6

ISSN: 2248 –9215
CODEN (USA): EJEBAU

Effect of *Datura stramonium* seed extracts on haematological parameters of West African Dwarf (WAD) bucks

***Thomas A. Fatoba[1], Adefunmilayo A. Adeloye[2] and Ayodele O. Soladoye[3]**

[1]*Department of Biological Sciences, Ondo State University of Science and Technology, Okitipupa*
[2]*Department of Animal Production, University of Ilorin, Ilorin*
[3]*Department of Physiology and Biochemistry, University of Ilorin, Ilorin*

ABSTRACT

Twenty-five West African Dwarf (WAD) bucks aged 1 - $1^1/_2$ years, weighed 8.76±1.23kg were used to evaluate the influence of Datura stramonium seed extracts on some haematological parameters like haemoglobin (Hb), packed cell volume (PCV), red blood cell (RBC), white blood cell (WBC), mean corpuscular volume (MCV) mean corpuscular haemoglobin concentration (MCHC), mean corpuscular haemoglobin (MCH), neutrophil and lymphocytes. The results showed that Hb, PCV, RBC and MCV were significantly increased ($p<0.05$) by the extract but lower ($p<0.05$) value observed in MCH and MCHC for the treated bucks. However, treated bucks had higher ($p<0.05$) WBC than the control except at highest dosage (0.08ml) of the Datura stramonium seed extract. It is considered that the extract was beneficial because it increased haemoglobin level which further leads to credence to the observation that the extract may boost oxygen delivery to the tissues.

Keywords: haemoglobin, packed cell volume, red blood cell, white blood cell, neutrophil

---

INTRODUCTION

The health status of an animal is usually revealed when blood parameters are assessed. This is because blood plays a vital role in physiological, nutritional and pathological status of organism [1]. Physiological parameter is a valuable means of diagnosing a disease [2,3] and protein status in goats [4]. Much research has been done on the composition and metabolism of certain compounds [5] and effects of chemical [6] on livestocks. Despite the wide acceptance of plants as source of medicaments by many in Nigeria, only very few of these plants (herbs) used have been properly identified and documented[7,8]. *Datura stramonium* Linn belongs to the family Solanaceae and is a large annual herb with conspicuous white-to-purple tubular flowers up to 10 cm (4 in) long and large, round, spiny fruits that grows all over the world mostly in dump sites, along roads and sometimes found around homes as ornamental as it is believed to have termicidal effect [9,10].

Different parts of the plant have been reported to be toxic and used medicinal purposes and contains a large number of alkaloids principally scopolamine and hyoscyamine [11]. The role of the numerous secondary compounds in plants may not be fully understood, but the general opinion is that the compounds serve as a protective measure by the plant against predators [12]. Such compounds limit the ability of herbivore to utilize the plant materials when

ingested. However, it is generally accepted that they may enable a plant to deter or limit production in herbivores [12]. Goat being natural browser normally avoids eating it, due to its unpleasant taste and odour or eats it when pressed for forage or when it is in hay as a source of nutrition. The mature fruits of *D. stramonium* when eaten by goats leads to apparent impairment, deleterious effects on body organs and at times death [12]. In view of the diverse medical applications of *D. stramonium* Linn. this study was designed to examine the effects of the seed extracts of the plant on some haematological parameters in West African Dwarf (WAD) bucks.

MATERIALS AND METHODS

Animals and management

The study was carried out at the Animal pavilion, Department of Animal Production, University of Ilorin, Ilorin (Southern Guinea Savannah ecological zone) Nigeria. Twenty-five West African Dwarf (WAD) bucks aged 1 - $1^1/_2$ years, weighed 8.76±1.23kg were used. They were housed in a fenced pen with shade and open space. They were fed with grasses *(Panicummaximum*) *ad libitum* supplemented with concentrate ration (500g/animal; consisting of maize (30%), groundnut cake (10%), wheat offals (32%), palm kernel cake (25%), bone meal (2%), salt (0.5%) and vitamin/mineral premix (0.5%). They were dewormed and injected with broad-spectrum antibiotic. They had access to fresh water *ad libitum* and remained in this condition for 28 days prior to commencement of the experiment.

Source of materials

Datura stramonium (seeds) was obtained from Oke –odo, Tanke, Ilorin, Kwara State, Nigeria. It was identified at the department of Plant Biology, University of Ilorin, Ilorin, where voucher specimen had been deposited. Animals were obtained from Ago market, Ilorin. All other reagents were of analytical grade. 250g dried seeds of *Datura stramonium* were subjected to cold extraction using 1litre of distilled water without agitation for 48 hours. The extract was retained for the experiment. The bucks were divided into 5 treatment groups and each treatment group were subcutaneously administered with different levels of the aqueous extract consisting of 0, 0.02, 0.04, 0.06 and 0.08ml/kgBW of the extract for 10 consecutive days.

Data Collection

The bucks were bled weekly through jugular vein and 5ml of blood samples was collected into plastic tube containing ethylene diamine tetra acetate (EDTA) for haematological determination using Analytical procedure [13] at the Chemical Pathology Department of University of Ilorin Teaching Hospital, Ilorin.

Statistical Analysis

Data generated will be analyzed by one way analysis of variance (ANOVA) and t-test. Significant different means will be separated using Duncan Multiple Range Test (DMRT) [14].

RESULTS

The effects of the aqueous seed extract on haematological parameters of WAD bucks as shown in Table 1 compared favourably with the control animals. The mean values of packed cell volume were higher in the treated group than the control ($p<0.05$). The mean values of red blood cells (RBC) count increased across the treatments but all the values are higher in the treated groups than the control ($p<0.05$). The mean values of MCV were higher in the treated groups than the control except the lowest dose, which occurred in the order of, 102.42, 112.00, 110.07, 108.92 and 106.67 fl for 0.02ml, 0.04ml, 0.06ml, 0.08ml, and control respectively (Table 1). The mean values when tested were found to be significant ($p<0.05$). Table 1 shows the mean values MCH of the tested WAD bucks with the seed extract as 41.83 ± 2.76, 34.83 ± 2.27, 35.58 ± 2.12, 36.42 ± 2.35, and 37.42 ± 2.12 pg with increasing level of plant extract administration. The values of MCH in the treated groups were lower than the control. The mean values significant ($p<0.05$). Total MCHC mean value is shown in Table 1 in which the values of the treated groups lower than the value obtained for the control and when tested are significant ($p<0.05$). Total WBC counts are shown in Table 1. The mean values when tested were found to be statistically different ($p<0.05$).The values obtained for neutrophils shown in Table 1 in which the values obtained for treated animals were higher than the control except at 0.02ml level ($p<0.05$). Fig 1 shows the mean values of the lymphocytes in which the values obtained for control animal higher than the treated animal except at 0.02ml level and the values were significant when tested ($p<0.05$).

Table 1: Effect of the aqueous seed extract of *Datura stramonium* on haematological parameters in WAD bucks

Parameters	Treatments (ml/kgBW) (concentration of the seed extracts) control	0.02	0.04	0.06	0.08	S.E
Hb (g/dl)	7.77^{d}	7.81^{cd}	8.15^{abcd}	8.26^{ab}	8.52^{a}	0.135
Packed cell volume (%)	22.08^{c}	24.42^{b}	27.33^{a}	27.58^{a}	27.67^{a}	0.490
Red blood cell ($x10^{12}$/l)	9.75^{c}	13.35^{a}	13.10^{ab}	12.70^{ab}	11.60^{b}	0.301
Mean corpuscular volume (fl)	$I06.67^{ab}$	102.42^{b}	112.00^{a}	110.67^{a}	108.92^{a}	1.783
MCH (pg)	41.83^{a}	34.83^{b}	35.58^{b}	36.42^{b}	37.42^{ab}	1.422
MCHC (g/dl)	37.75^{a}	29.33^{b}	30.17^{b}	32.25^{b}	32.33^{b}	1.392
WBC $x10^{12}$/ l	20.14^{b}	22.97^{a}	20.89^{a}	20.70^{a}	13.22^{c}	0.374
Neutrophils %	31.17^{b}	25.58^{c}	32.83^{b}	35.00^{b}	40.08^{a}	1.225
Lymphocytes%	68.83^{b}	74.42^{a}	67.17^{b}	65.00^{b}	59.92^{c}	1.225

a,b,c; values along the same row with different superscripts are statistically different ($p<0.05$)
S.E = Standard error

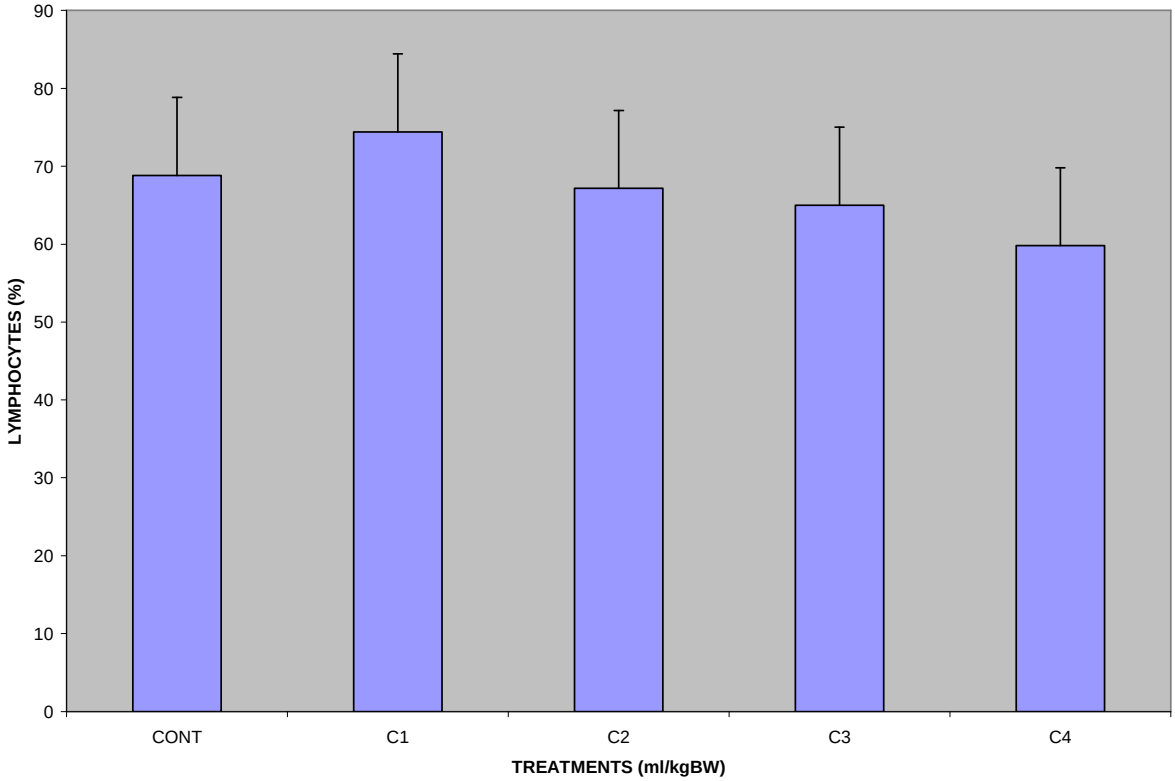

Fig 1: Mean Blood Lymphocytes of the WAD-Bucks upon Administration of *Datura stramonium* seed extract
CONT. control,
C1 0.02ml
C2 0.04ml
C3 0.06ml
C4 0.08ml

DISCUSSION

Hb in this study fell within the range reported by [4] for the West African Dwarf goat and the report of [15] for Red Sokoto goat. The West African Dwarf goats seem to possess relatively high Hb values an obvious advantage in terms of the oxygen carrying capacity of the blood and an indication that the presence of the alkaloid in the extract did not have a detrimental effect on the animal.

PCV values obtained in this study compared well with the report of [15] for Red Sokoto goat (25.7± 3.1) and fell within the range reported by [4]for WAD goats. The reports in Baladi goats [16] show a PCV value of 27.25 ± 0.59.

The findings of this study support that PCV varies with breed [15,16]. In contrast,[17,18,19] attributed increase in PCV values in cattle to increase in environmental temperature. Results from the current study confirmed the works of [20] that stimulant like THC increases the PCV and Hb, which were seen in the treated animals. Hb and PCV are very important in the assessment of aneamic condition [21] and the result showed that Daturine will not induce anaemia hypoxia [22]. The WAD goats seem to possess immune system, which provides a rapid and potent defense against any infection agent and is probably the physiological basis for the adaptation of this species to this eco-zone characterized with high prevalence of disease [4]. The eco-zone is infested with tse-tse fly and the dwarf goat thrives well and reproduces with twins and triplets birth. The findings of this study suggest that WAD goats have the tendency for compensatory accelerated production (CAP) of PCV in case of infection. Compensatory accelerated production has been known to return PCV to normal following an infection [23]. [4] reported that PCV serve as a beneficial instrument in assessing the protein status and possibly forecasting the degree of protein supplementation in goats at different physiological status.

The total RBC counts in this study fell within the values reported by [4,15]for WAD- bucks and Red Sokoto goats. The red blood cells are very important in the transport of respiratory gases and the increase in total RBC counts and Hb may be an indication of oxygen transport to the tissues, therefore cellular respiration will not be affected [24]. The increase could be as a result of the extract acting as a stimulant [3,25]. Therefore, the red cells will function normally in transporting oxygen [24]. MCHC values were higher than [4]report on WAD goat but fell below the values for Red Sokoto goat [15].

The MCHC and MCH are indices of haemoglobin concentration in 100ml of blood and in each cells respectively [26] and their values show that the haemoglobin levels in the red cells of the treated animal are higher. MCV refers to the volume of each red cell [22](Green, 1978) and increment coupled with reduction in MCHC and MCH indicates that the osmotic fragility of the cell will be decreased [27]. Age was said to have a significant effect on Hb, RBC, and MCHC values in Red Sokoto goats [15]WAD goats [4]. The total WBC was higher in this study than Red Sokoto goat [15]and compared well with the range (6.8 -20.1) reported for the goat [4]and cattle [28] in Nigeria and Nigerian buffaloes [29]. The higher WBC suggested a well-developed immune system in the WAD goats that proffer good health

In goats, like other ruminants there are more lymphocytes than neutrophils in circulation [29]. However, the values obtained in this study fell within the broad range recorded for Red Sokoto goats [4, 15]and cattle [30,31], and suggestive of a well-developed immune system in the WAD goats that proffer good health. The significant increase in the percentage neutrophil shows that the ability of the animal to fight infections will be greatly increased since neutrophils are the first line of phagocytic defence against invading agents in the body [22]. So, it could be concluded that Daturine is beneficial to the body. Likewise the significant increase in WBC count indicates that Daturine has immunostimulatory effect [32]. This may be the result of an increase in white cell production or a decrease in its destruction.

Also, sex was observed to have a significant effect on the lymphocytes and neutrophils. It has been observed that prolonged cocaine and THC [33] use has been associated with an increased rate of infections including HIV and the suppression of variety of immune functions [34,35]. Suppression of natural killer cell cytotoxicity [36], B-lymphocyte activity [37], and impairmentof macrophage functions [38,39] have been described as well as an enhancementof oxygen radical production in alveolar macrophages [40] and an increased B-cell proliferation response [41]. Daily cocaine injection for short periods of time (less than 14 days) causes inhibition of cellular cytotoxic activities mediated by natural killer (NK) cells and cytotoxic γ-lymphocytes, suppression of interleukin – 2(IL), IL-4 and interferon γ (IFN) production of spleen cells in mice, inhibition of β lymphocyte response to LPS and antibody in mice, increased number and activity of NK cells in human subjects and greater responsiveness of lymphocytes to PHA and Con A in mice [35,42]. Short-term exposure of cocaine however does not adequately reflect the effects of chronic cocaine exposure in human subjects [43].

From this study, it could be concluded that Daturine produced antidepressant, vasoconstriction and immunostimulatory effect on the hypothalamic-pituitary axis in order to inhibit gastric secretion, increase pulse rate, heart rate and WBC [3,32,44] and an indication that the presence of the active principle in the extract did not have a detrimental effect on the animal.

CONCLUSION

The results of this study has revealed that the aqueous extract of the seed of *Datura stramonium* Linn produced significant effect on the blood parameters of the WAD bucks. However the significant decrease in the level of the WBC counts at highest dose showed that the extract of the seed of *D. stramonium* is deleterious to animals on high dose and could lead to alteration in kidney functions and haematological parameters.

REFERENCES

[1] Kakade, ML; Simons, NR; Liener, IE and Lambert,JW,*J. Agric. Food Chem*.,**1972**,**20 :**87- 90.
[2] Santschi, EM; Grindem, CB; Tate, LP and Corbett, WT, *Vet Surg*., **1988**,**17**:8- 9.
[3] Ganong, WF, *Review of Medical Physiology* (International edition) McGraw Hill Companies Inc, Singapore,**2005**,25- 557pp.
[4]Daramola, JO; Adeloye, AA; Fatoba, TA and Soladoye, AO, *Livestock Research for Rural Development*, **2005**, **17**(8).
[5] Vitic, J. and Stevanovic, J., *Comp. Brioche. Physiology*.,**1993**,**106b** ,1, 223- 269.
[6] Simpson, BB and Conner- Ogorzaly, M., *Economic Botany plants in our world*, New York, McGraw- Hill Inc., **1996**,314- 315.
[7] Sofowora, A., *The Pan African Conference on Research into Medicinal Plants* 7th – 10th April, 1974. 1st P*roceedings of a conference on African Medicinal Plants*; University of Ife press, Ile- Ife, **1979**,13-58.
[8] Akinniyi, JA and Sultanbawa, MUA, *Annals of Borno* ,**1983**, 1,88
[9] Iwu, MM, *Handbook of African Medicinal Plants*. CRC Press New York,**1993**,169- 171.
[10] Gill, LS, *Ethnomedicinal plant in Nigeria*, University of Benin press, Benin City Nigeria,**1999**.
[11] Mothes, K.,*Ann.Rev. Plant Physiol*., **1955**,**6**. 373- 432.
[12] Considine, MD, *Van Nostrand's Scientific Encyclopedia* 6th edn. Van Nostrand's Reinhold Company New York, **1982.**
[13] Baker, FJ and Silverton, RE, *Introduction to Medical Laboratory Technology* 6th edn. Butterworth and Publishing co.**1985**, pp 323- 521.
[14] Muktar, FB, , Introduction to Biostatistics, 1st edn. Samid Publishers, Nigeria,**2003,** 152.
[15] Tambuwal, FM, Agale, M. and Bangana, A, *Proceeding of 27th Annual Conf. Nig. Soc. of Animal Production (NSAP)* March, 17- 21, FUTA, Akure, Nigeria, ., **2002**, pp 50- 53.
[16] Azab, ME and Abdel-Maksoud , HA,*Small Ruminant Research*, **1999**,**34,** 77- 85.
[17] Rusoff, LL, Johnston, JE and Branton, C.,*Bulls. Journal of Dairy Science*, **1954**,**47**, 30- 36.
[18] Bianca, W., , *British Veterinary Journal*,**1955, 113,** 227- 241.
[19] Patterson, TB, Shrode, RR, Kunkel, HO and Leighton, RE and Rupel, IW, *Journal Dairy Science*.,**1960**, **43** : 1263- 1274.
[20] Oseni, BS, Togun, VA and Taiwo, OF, *World Journal of Medical Sciences*,**2006**,**1** (2): 82- 85.
[21] Harper, HA,*A review of physiological chemistry*, 15th edition, Lange Medical Publications, San Francisco, Carlifornia,**1975**,
[22] Green, JH, *An Introduction to Human Physiology*. African edition, Oxford University Press, Ibadan.**1978**,
[23] Dargie, JD and Allonby, EW*Amer. J. Vet. Res.*,, **1975**, **30:** 1967- 1972.
[24] de Gruchy, GC, The red cell anaemia. In: *Clinical Haematology in Medical Practice.* 3rd edition, Blackwell Scientific Publications, Oxford,**1976**,
[25] Erowid,Erowid Datura vaults; http:// www: datura.-FAQ .html, **1999**.
[26]Wickramasingh, SN, *Functions of red cells*. In: Systemic Pathology 3rd edition,Churchill, Livingstone,**1991**,Vol. 2 pp 6.
[27] Olaleye,SB, Iranloye, BO, Salami,HA, and Elegbe, RA,*Biosci. Res. Commun*.,**1999**,**11**(2): 107- 112.
[28] O. O. Oduye, OO, and Fasanmi, F.,*Bulletin Epizootic Diseases in Africa*,**1971**,**19**: 333- 339.
[29] Olusanya, SK, Edewor, EE, Health, E.,*Nigerian Veterinary Journal*,**1976**,**5**(1): 27- 31.
[30] Schalm, OW, Jain, NC, and Carol, EJ, *Veterinary Haematology*, 3rd edition, Lea and Febiger, Philadephia, USA,**1975**,13: 23- 136.
[31] Benjamin, MM, *Outline of Veterinary Clinical Pathology*, 2nd edition, Iowa University press, Iowa USA, **1978**,35- 105.
[32] Owoyele, BV, J. O. Adebayo, JO, Muhammad, NO, Ebunlomo, AO,*Nig. J. Pure Appli. Sci*.,**2003**,**18**, 1340- 1345.

[33] Klein, TW, Newton, CA, Larsen, K., Lu, L., Perkins, I., Nong, L., Friedman, H., *J. Leuk. Biol*., **2003**, **74:** 486-496.
[34] Chaisson, RE, Bacchetti, P., Osmond, D.,. Broide,,B., Sande, MA,and Moss, AR,*JAMA,* **1989**,**261**, 561-565.
[35]Watzi, B., and Watson, *Life Science*,**1990**,**46**, 1319- 1329
[36] Massi, P., Fuzio, D., Vigaano, D., Sacerdote, P.,and Parolaro, D.,*Eur. J. Pharmacol*. **2000**,**387**: 343- 347.
[37] Klein, TW. Newton, CA, Widen, R., Friedman, H., *J. Immunopharmacol*.,**1985**, **7**: 451- 466.
[38] Lopez- Cepero, M., Friedman, M., Klein, TW, and Friedman, H., *J. Leukoc. Boil*., **1986,39**: 679-686.
[39] Baldwin, CG, Tashkin, DP, Buckley, DM, Park, AN, Dubinelt, SM, and Roth, MD, *Am . J. Resp crit Care Med*.**1997**, 1, **156**: 1606- 1613.
[40] Sarafian, TA, Magallanes, JA, Shau, H., Tashkin, DP, and Roth, MD, *Am. J. Resp. Cell Mol. Biol..*, **1999**, **20**: 1286- 1293.
[41] Derocq, JM, Segui, M., Marchand, J., Le Fur, G., Cassellas, P., *FEBS Lett*.,**1995**, **369**: 177- 182. .
[42] Francessco, PD, Marini, SS, Francesca, P., Favalli, C., Tubaro, E., Garaci, E., *Immunol. Res.*,**1992**,**11** 74- 79.
[43] Wang, Y.,Huang, DS, Giger, PT, Watson, RR, *Advances in the Biosciences*,**1993**,**86,** 623.
[44] Martin, EA, *Concise Medical Dictionary* 2nd edition Oxford University Press, Tokyo,**1985**,7- 659.