

APRW -65

Effect of Aqueous Extract of *Gmelina arborea* Leaves on Haematology of Female Rabbits

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Abstract

A 14-week study using thirty two (32) female grower rabbits weighing between 900-1000g was conducted to investigate the effect of aqueous extract of *Gmelina arborea* leaves on haematological indices of female grower rabbits. The rabbits were randomly grouped into four and assigned to four treatments of 0 (T₁), 200 (T₂), 400 (T₃), and 600ml/L (T₄) of aqueous extracts of *Gmelina arborea* leaves. Each treatment consisting of 8 rabbits per group was replicated 8 times, one rabbit per replicate. At the end of the experimental trial which lasted for 56 days, blood samples were collected from the rabbits and evaluated. Significant differences ($p < 0.05$) were observed on Packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), white blood cell (WBC), Lymphocyte and platelets. Red blood cell (RBC), haemoglobin (Hb) and mean corpuscular haemoglobin concentration (MCHC) were similar ($p > 0.05$) across the treatments. Haematological values obtained were comparable to reported normal values for healthy rabbits. This study thus showed that aqueous extract of *Gmelina arborea* leaves up to 600 ml per litre support normal blood profile of female rabbits.

Keywords: Hematology, aqueous extract, *Gmelina arborea*, rabbits, normal values.

Introduction

Gmelina arborea locally known as Malina is a fast growing deciduous tree, about 30 m or more in height and a diameter of up to 4.5 m. The leaf is green and the fruit is up to 2.5cm long, smooth, dark green, turning yellow when ripe, has a fruity smell and seed inside (Jensen, 1995). The chemical composition of secondary metabolites and antioxidant activity of *G. arborea* showed its richness in phenolic compounds and natural antioxidant substances that play an important role in pharmacology (N'gaman *et al.* 2009). *Gmelina arborea* is used for the management and treatments of disease in animals and humans. It is used for the treatment of snake-bite and scorpion sting. The juice of tender leaves added to cow's milk is used in gonorrhea. The plant is anthelmintic and is useful in treatment of piles abdominal pains, burning sensation, fevers. The extract form of leaves is reported to have wound-healing properties (Banu *et al.*, 2013). A paste of leaf is applied to the head for the relief of headache in fever (Khare, 2004). The leaves are used in dyspepsia, cough and wound treatment. Leaf paste is used in cephalgia and foul ulcer (Denish, 2005). Most of the available studies involving *Gmelina arborea* extracts on animal models are predominantly on rats. There is need to investigate the effect of such material on the physiology, general health and productivity of other species of animals.

This study, therefore, was aimed at investigating the effect of aqueous extracts of *Gmelina arborea* leaves on haematology of female rabbits.

Materials and Methods

The study was conducted at the Rabbitry unit of the Livestock Teaching and Research Farm, Federal University of Agriculture, Makurdi. Makurdi is located at Latitude 7°14' North and Longitude 8°21' East and lies within the southern guinea savannah region of Nigeria. The area is warm with temperature range of 24 to 36° and high temperature is experienced between late February and April. The rainfall is between 508 and 1016mm (TAC, 2009).

Fresh *G. arborea* leaves used for the experiment were sourced within the environment of the Federal University of Agriculture, Makurdi. The leaves were shade-dried single layered at room temperature until they became crispy to touch retaining their green colouration. After the moisture was dried out, a clean mortar and pestle was used to pound the leaves to powder. A known quantity (250 g) of the pounded leaves was measured using a sensitive weighing scale which was then dissolved in 1000 ml of sterile distilled water and allowed to stand for 30 minutes, after which the leaves extract was obtained by squeezing in a muslin cloth.

Thirty-two (32) growing female rabbits of mixed breeds and sexes, aged between 7 - 8 weeks and weighing between 900 – 1000 g were used for the experiment. The rabbits were sourced from rabbit farmers within Makurdi. The rabbits were allowed an acclimatization period of 14 days before commencement of the study, and during this period the rabbits were dewormed using Ivomercin subcutaneously at a dosage of 0.1ml per rabbits. This was to guard against both endo and ecto-parasites. The rabbits were then weighed and randomly assigned to the four (4) treatments with eight (8) rabbits per treatment. Each rabbit served as a replicate. Diets and clean drinking water were supplied to the rabbits *ad libitum* throughout the feeding period which lasted for eight (8) weeks.

Table 1; Ingredients and nutrients composition of basal diet

Ingredients	Quantity (%)
Maize	51.65
Fullfat soybean	20.30
Brewers dried grain	10.0
Rice offal	15.0
Mineral/vitamin premix*	0.25
Bone meal	2.50
Common Salt	0.30
Total	100.0
Crude protein	16.8
Crude fibre	9.50
Ether extract	6.77
Digestible energy DE (Kcal/kg)	2994.53

*0.25 kg of Mineral/Vitamin premix contained the following: Vitamin A 1,800 IU, Vitamin D 250 IU, Vitamin E 8,000 IU, Vitamin K 750 mg, B1 750 mg, B2 1000 mg, B6 800 mg, B12 25 mg Folic 300 mg, Niacin 5000 mg, Pantothenate 3000 mg, Biotin 25 mg, Choline 160 g, Thyroxine 300 mg, Copper 0.4 g, Iron 4 g, Manganese 5.5 g, Iodine 0.2 g, Zinc 5 g, Cobalt 0.15 g, Selenium 0.15 g.; DE=Digestible energy

At the end of the experiment (week 8) 5ml of blood samples were collected from three (3) rabbits per treatment for the determination of haematological parameters. This was achieved by puncturing the jugular vein and allowing free flow of blood into labelled sterile bottle containing 1.0mg/ml ethyl diaminetetracetic acid (EDTA) as anticoagulant. Blood parameters determined included, packed cell volume (PCV), red blood cell (RBC), mean corpuscular volume (MCV) mean corpuscular haemoglobin (MCH) mean corpuscular haemoglobin concentration (MCHC), white blood cells (WBC) lymphocytes number(Lymph No.) lymphocytes percentage (Lymph %) and platelets (Plt) following the method as reported by Ahemen (2015).

Data obtained from this study were subjected to one way analysis of variance (ANOVA) using GenStat (Release 4.24) statistical package. Significant differences between treatment means were separated using Duncan's Multiple Range Test of the same software.

Results and Discussion

The results on the effect of the treatment diets on blood profile of female grower rabbits are presented in Table 2. Significant differences ($p < 0.05$) were observed in all the parameters except RBC, Hb and MCHC. Packed cell volume value was significantly ($p < 0.05$) higher in rabbits on T_3 than T_1 , T_2 , and T_4 . Values obtained did not follow a particular trend and were comparable to reference range of 21.00 to 45.00% for clinically healthy rabbits (Mitruka and Rawnsley, 1977). The values in this study were also comparable values of 31 to 34 % reported by Opara *et al.* (2012) who administered aqueous extracts of *Gmelina arborea* up to 450 ml /L to rabbits. The MCV and MCH of rabbits on T_4 was significantly ($p < 0.05$) reduced. MCV values of 57.87 to 62.67 fl reported in this study were lower than 67.90 to 90.00fl reported by Saleh *et al.* (2014) when graded levels of browse forage plants was fed to growing rabbits. The values obtained were also lower than the findings (77.10 to 81.80fl) of Ahemen *et al.* (2015) but within the normal range of 50 to 75 fl reported by Medirabbits (2007). Mean corpuscular haemoglobin (MCH) values in the range of 19.00 to 20.53 pg obtained in this study were lower than 21.00 to 22.50 pg reported by Saleh *et al.* (2014) and 25.77 to 27.70pg reported by Ahemen *et al.* (2015). These values however compared favourably with 19.20 to 29.5 Pg reported by Hewitt *et al.* (1983) for normal healthy rabbits implying that the rabbits were not in anemic state.

White blood cells WBC and Lymphocyte number were significantly ($p < 0.05$) higher in rabbits on T_1 , T_3 and T_4 compared to rabbits on T_2 . White blood cells of rabbits on T_2 ($3.00 \times 10^9/l$) was below the reference range of 5.00 to $8.00 \times 10^9/l$ reported by Mitruka and Rawnsley (1997). According to Reilly (1993) WBC below the normal range is an indication of allergic conditions, anaphylactic shock and certain parasitism. Opara *et al.* (2012) reported low range of 3.4 to $4 \times 10^9/l$ in rabbits administered aqueous extracts of *Gmelina arborea* up to 450 ml /L through drinking water. Lymphocyte percentage was significantly ($p < 0.05$.) lower in rabbits on T_1 and T_3 . Ihedioha (2008) stated that lymphocytes are responsible for immune-mediated defense of the body (cell-mediated and humoral immunity) and that low percentage of lymphocyte implies that the animals are prone to be more susceptible to secondary and opportunistic infections. Lymphocytes percentage range of 44.77 to 55.23% obtained in this study were comparable to the 55 to 60 % reported by Opara *et al.* (2012). However, the values did not align with the report (69.33 to 73.66%) of Adeyemo *et al.* (2013), 57.67 to 66.33% by Ahemen *et al.* (2015). The values however compared favourably with reference range of 43.00 to 80. 00 (Medirabbit, 2015). Lymphocyte within the normal range is an indication that the treatments do not affect the immune status of the experimental animals. Platelet value was significantly ($p < 0.05$) higher in rabbits on T_3 and T_4 than rabbit on T_1 and T_2 . Platelet of rabbits on T_1 and T_2 were below standard range of

between 200 to 650 x10⁹/l (Medirabbit). Low platelet concentration suggests that the process of clotting will be prolonged resulting in excessive loss of blood in the case of injury (Etim *et al.*, 2014).

Table 2: Effect of *G. arborea* aqueous extract on haematological parameters of grower female rabbits

Parameters	T ₁ (0 ml)	T ₂ (200 ml)	T ₃ (400 ml)	T ₄ (600 ml)
PCV (%)	31.50±2.22 ^b	32.17±2.13 ^b	36.27±2.28 ^a	32.50±0.70 ^b
RBC (x 10 ⁶ /l)	5.07±0.41	5.25±0.30	5.79±0.28	5.54±0.21
Hb (g/dl)	10.40±0.72	10.77±0.79	11.93±0.73	10.77±0.17
MCV (fl)	62.30±1.16 ^a	61.37±0.52 ^a	62.67±1.19 ^a	57.87±0.97 ^b
MCH (Pg)	20.50±0.26 ^a	20.43±0.28 ^a	20.53±0.47 ^a	19.00±0.40 ^b
MCHC (%)	33.00±0.25	33.40±0.20	32.87±0.19	32.90±0.20
WBC (x 10 ⁹ /l)	5.17±1.05 ^a	3.00±0.92 ^b	5.90±1.86 ^a	5.03±1.43 ^a
Lymph (No)	2.17±0.23 ^a	1.63±0.41 ^b	2.47±0.52 ^a	2.87±0.67 ^a
Lymph (%)	44.77±6.62 ^b	55.23±3.50 ^a	45.57±4.72 ^b	54.70±2.20 ^a
Plt (x 10 ⁹ /l)	72.00±22.61 ^c	141.70±91.70 ^b	241.00±73.30 ^a	264.70±31.70 ^a

^{abc} Means on the same row with different superscript are significantly ($p < 0.05$) different from each other. PCV = Packed Cell Volume, RBC= Red Blood Cell, MCV= Mean corpuscular volume, MCH= mean corpuscular haemoglobin, MCHC= Mean Corpuscular Haemoglobin Concentration, WBC= White Blood Cells, Lymph = lymphocytes, Lymph (%)=lymphocytes percentage, Plt.=platelets.

Conclusion and Recommendations

In this study, it was revealed that aqueous extract of *G. arborea* leaf does not induce any adverse effects of haematological parameters of rabbits. It is recommended that studies on the effect of aqueous extract of *G. arborea* on haematology and serum biochemistry of other species of livestock be carried out.

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