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Influence of *Carica papaya* Leaf Extract on Haematology and Serum Biochemistry of Male and Female Rabbits

J.C. Wali and I.P. Solomon

Department of Animal Science, University of Uyo, Uyo, Nigeria

Abstract

A comparative study was carried out to show the influence of *Carica papaya* Leaf extract (CPLE) on the haematology and serum biochemistry of male and female rabbits using a two by four (2x4) factorial experimental design. Twenty four (24) crossbred weaner rabbits (6 - 8 weeks old) of both sexes were divided into groups 1 and 2 of twelve animals each, such that group 1 were all males and group 2, all female animals. Each group was then divided into treatments according to the doses of the extract assigned randomly as follows: T₁ (0.0 ml CPLE), T₂ (0.5 ml CPLE), T₃ (1.0 ml CPLE) and T₄ (1.5 ml CPLE). The results obtained showed a high significant difference ($p < 0.001$) for haematology across treatments, sex and in the interaction between treatment and sex. Also, for serum biochemistry (ALP, AST and ALP), there was a high significant difference ($p < 0.001$) in the interaction between treatment and sex, a high significant difference ($p < 0.001$) for AST across treatment as well as a significant different ($p < 0.05$) across sex. Thus from the study, 0.5 ml CPLE is best for especially haematological and serum biochemical parameters, and 1.0 ml CPLE is best for immune response especially for the male rabbits.

Keywords: Haematology, serum biochemistry, rabbit, *Carica papaya*, leaf extract

Introduction

According to Aro *et al.* (2013), the physiological status of livestock and even humans can be ascertained from the knowledge of their haematological parameters, liver functionality and their performance record over time. The papaya plant according to Duke (2007), contains biologically active compounds made up of alkaloids, carpaine, dehydrocarpaines, flavonoids, tannins, nicotine, cyanogenic glucosides, papain and chymopapain. The biologically active compound can act on the bone marrow, prevent its destruction and enhance its ability to produce platelets as well as stabilize liver activities which according to Krishna and Thomas (2014) can induce immunity and keep the animal healthy.

The objective of this study was to show the effect of *Carica papaya* leaf extract on the haematology and serum biochemistry of male and female rabbits.

Results and Discussions

Table 1 shows the influence of *Carica papaya* leaf extract (CPLE) on the haematology of male and female rabbits across treatments and sex. Table 2.0 shows the interaction between treatment and sex. From table 1.0, all the parameters were highly significant ($p < 0.001$) across treatment but across sex, Red Blood Cell (RBC), Platelet (PLT), Neutrophil (Neut), Mean Cell Volume (MCV) and Haemoglobin (HGB) were not significant ($p > 0.05$).

Table 1: Effect of CPLE on haematology of male and female rabbits fed different doses of the extract across treatments and sex

Factors	WBC	RBC	HCT	PLT	LYM	NEUT	MCHC	MCV	HGB
Treatment	(10 ³ /uL)	(10 ³ /uL)	(%)	(10 ³ /uL)	(%)	(%)	(g/dL)	(fL)	(g/dL)
Initial reading	4.70 ^b	4.86 ^b	30.50 ^a	406.00 ^a	0.00 ^b	99.70 ^a	28.50 ^a	73.25 ^c	10.15 ^b
T ₁	2.54 ^c	5.36 ^{ab}	34.20 ^b	278.00 ^{ab}	62.52 ^c	32.60 ^c	31.80 ^b	63.85 ^b	10.90 ^{ab}
T ₂	4.33 ^b	5.78 ^a	32.27 ^c	196.00 ^b	71.67 ^a	24.60 ^c	29.70 ^c	64.85 ^{ab}	11.07 ^a
T ₃	8.27 ^d	4.26 ^c	26.07 ^d	442.00 ^a	29.50 ^d	84.20 ^b	29.25 ^d	61.52 ^d	7.62 ^c
T ₄	1.42 ^a	5.07 ^b	33.38 ^b	278.00 ^{ab}	74.31 ^a	22.70 ^c	30.75 ^e	65.85 ^a	10.25 ^b
SEM	0.329	0.16	0.877	64.10	1.27	4.21	0.11	0.62	0.260
P-Level	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**
Sex 1- Male	6.22	5.06	32.98	348.00	43.09	54.50	29.75	65.67	9.82
Sex 2- Female	2.29	5.08	31.20	292.00	52.12	51.00	30.25	66.05	10.18
SEM	0.21	0.10	0.561	40.50	0.800	2.66	0.07	0.39	0.165
P-Level	<0.001**	0.880 ^{ns}	0.095 ^{ns}	0.355 ^{ns}	<0.001**	0.367 ^{ns}	<0.001**	0.500 ^{ns}	0.138 ^{ns}

In table 2, White Blood Cell (WBC) count, Red Blood Cell (RBC) count, Haematocrit (HCT), Platelet (PLT), Lymphocyte (LYM), Mean Cell Haemoglobin Concentration (MCHC), Haemoglobin (HGB), were highly significant ($p < 0.001$). Neutrophil (Neut) and Mean Cell Volume (MCV) and Haemoglobin (HGB) were significant ($p < 0.05$). By comparison, T₂ had the normal range of values for White Blood Cell (WBC), Red Blood Cell (RBC), Haematocit (HCT), Lymphocyte (LYM), and Haemoglobin (HGB) as reported by Olabanji *et al.* (2008 and Oyejibi *et al.* (2007).

Table 2.0: influence of CPLE on Haematology across the interaction between treatment and sex

Treatment X Sex	WBC (10 ³ /uL)	RBC (10 ³ /uL)	HCT (%)	PLT (10 ³ /uL)	LYM (%)	NEUT (%)	MCHC (g/dL)	MCV (fL)	HGB (g/dL)
Initial: male	3.10 ^{bc}	4.07 ^e	29.80 ^d	109.00 ^d	0.00 ^b	99.40 ^a	29.20 ^{cd}	73.20 ^a	8.70 ^e
Initial: female	6.30 ^b	5.70 ^{abc}	31.20 ^{bcd}	703.00 ^{cd}	0.00 ^a	100.00 ^b	27.80 ^{ab}	73.30 ^d	11.60 ^{cd}
T ₁ : Male	3.88 ^a	5.22 ^a	32.90 ^a	465.00 ^{cd}	71.35 ^a	24.70 ^b	30.40 ^{cd}	63.00 ^{ab}	10.00 ^{ab}
T ₁ : Female	1.20 ^e	5.49 ^{cd}	35.50 ^{cd}	90.00 ^a	53.70 ^b	40.60 ^a	33.20 ^d	64.70 ^c	11.80 ^{de}
T ₂ : Male	7.45 ^a	5.95 ^d	38.55 ^{bcd}	343.00 ^d	71.75 ^a	28.40 ^b	29.40 ^b	65.50 ^a	11.35 ^c
T ₂ : Female	1.20 ^d	5.61 ^{ab}	36.00 ^{cd}	50.00 ^{ab}	71.60 ^b	24.40 ^a	30.00 ^e	64.20 ^a	10.80 ^a
T ₃ : Male	15.55 ^d	5.16 ^{abc}	30.85 ^{ab}	754.00 ^d	0.00 ^d	100.00 ^b	28.95 ^f	59.75 ^{ab}	8.95 ^a
T ₃ : Female	1.00 ^d	3.37 ^{abc}	21.30 ^{ab}	130.00 ^d	59.00 ^a	68.50 ^b	29.55 ^b	63.30 ^{ab}	6.30 ^{abc}
T ₄ : Male	1.10 ^d	4.90 ^f	32.80 ^e	70.00 ^d	72.33 ^c	23.70 ^c	30.80 ^c	66.90 ^d	10.10 ^{cd}
T ₄ : Female	1.75 ^{cd}	5.24 ^{abc}	33.95 ^{bc}	485.00 ^{abc}	76.30 ^a	21.70 ^b	30.70 ^b	64.75 ^{ab}	10.40 ^b
SEM	0.465	0.22	1.25	90.60	1.79	5.96	0.15	0.87	0.37
P-LEVEL	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	0.012*	<0.001**	0.027*	<0.001**

*SEM: standard error mean, *WBC: White Blood cell, *RBC: Red Blood Cell, *HCT: Haematocrit, *PLT: Platelet, *LYM: Lymphocyte, *NEUT: Neutrophil, *MCHC: Mean Cell Haemoglobin Concentration, *MCV: Mean Cell Volume, *HGB: Haemoglobin, *CPLE: *Carica papaya* leaf extract, (p<0.001**): highly significant. *a-e Means with the same superscript across columns are not significantly different; *T₁: 0.0ml CPLE, T₂: 0.5ml CPLE, T₃: 1.0ml CPLE, T₄: 1.5ml CPLE.

Table 3 shows the indices of the three liver enzymes considered; Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), and Alkaline phosphatase (ALP) in the serum. Aspartate aminotransferase (AST) was highly significant (p<0.001) across treatments, significant (p<0.05) across sex and highly significant (p<0.001) in the interactions between treatment and sex.

Table 3: Influence of CPLE on serum biochemistry of male and female rabbits fed different doses of the extract according to treatments, sex and the interaction between sex and treatment

Factors	AST (iu/l)	ALT (iu/l)	ALP (iu/l)
Initial	79.00 ^a	36.00 ^a	19.33
T ₁ (control)	95.00 ^a	21.90 ^b	22.51
T ₂ (0.5ml CPLE)	88.00 ^a	26.30 ^{ab}	21.82
T ₃ (1.0ml CPLE)	58.00 ^b	30.40 ^{ab}	22.27
T ₄ (1.5ml CPLE)	32.90 ^c	30.70 ^{ab}	22.03
SEM	6.91	3.29	1.15
P-Level	<0.001**	0.070 ^{ns}	0.322 ^{ns}
SEX 1- Male	62.00	32.40	21.80
SEX 2- Female	79.70	25.70	21.38
SEM	4.37	2.08	7.29
P-Level	0.010*	0.034*	0.688 ^{ns}
Interaction Between Treatment and Sex			
Initial: Male	79.30 ^b	51.30 ^a	26.60 ^a
Initial: female	78.90 ^a	20.70 ^{cd}	12.01 ^{abc}
T ₁ : Male	113.10 ^{abc}	29.80 ^{bc}	21.87 ^{ab}
T ₁ : Female	77.90 ^d	14.10 ^{de}	23.16 ^{cd}
T ₂ : Male	63.80 ^b	34.00 ^{bcd}	24.30 ^d
T ₂ : Female	113.10 ^b	18.50 ^{cde}	19.35 ^c
T ₃ : Male	25.00 ^a	17.60 ^e	18.49 ^{abc}
T ₃ : Female	91.40 ^a	43.20 ^{de}	26.04 ^{bc}
T ₄ : Male	28.70 ^{ab}	29.30 ^{ab}	17.69 ^a
T ₄ : female	37.10 ^{cd}	32.10 ^{bcd}	26.37 ^a
SEM	9.77	4.65	1.63
P-LEVEL	<0.001**	<0.001**	<0.001**

*SEM: Standard Error Mean, *AST: Aspartate aminotransferase, *ALT: Alanine aminotransferase, *ALP: Alkaline Phosphatase, P (<0.001**): highly Significant. *a-d Means with the Same Superscripts across columns are not Significantly Different. *CPLE: *Carica papaya* Leaf Extract. *T₁: 0.0ml CPLE, T₂: 0.5ml CPLE, T₃: 1.0ml CPLE, T₄: 1.5ml CPLE.

Alanine aminotransferase (ALT) was not significant ($p>0.05$) across treatments but was significant ($p<0.05$) across sex and highly significant ($p<0.001$) in the interaction between treatment and sex. The values for the liver enzymes were within the normal range in all the treatment as reported by Bradley T.A (2001). The significant difference thus shows the influence of the phytochemicals present in the leaf extract as reported by Susiji *et al* (2013). The fact that these enzymes were within normal range is an indication that the extract promotes the physiology of the animals as the under or over secretion of these enzymes into the blood by the liver could mean abnormality.

Conclusion and Recommendation

From the study, 0.5 ml CPLE is best for especially haematological and serum biochemical parameters, and 1.0 ml CPLE is best for immune response especially for the male rabbits as the synthesis of white blood cell is more at this treatment group.

References

- Aro, S.O., Ogunwale F.F. and Falade, O.A. (2013). Blood viscosity of finisher cockerel fed dietary inclusions of fermented cassava tube wastes. *Proceedings of the 18th Annual Conference of Animal Science Association of Nigeria*. Pp: 74-77.
- Bradley, T.A. (2001). What every veterinarian needs to know about rabbits. Zoological education network, Lake Worth, Florida.
- Duke, J.A. (2007). Duke's handbook of medicinal plants of Latin America. CRC Press, Boca, USD.
- Krishna Prabha, V. and Thomas, F. (2014). Formulation, nutrient and microbial analysis of papaya leaves and guava incorporated RTS beverage. *International Journal of Current Microbiology and Applied Science*, 3(5):233-236.
- Olabanji, R.O., Farinu, G.O., Akinlade, J.A. and Ojebiyi, O.O. (2007). Growth performance and haematological characteristics of weaner rabbits fed different levels of wild sunflower (*Tithonia diversifolia* Hems LA. Gray) leaf blood meal mixture. *Proceedings of 32nd Annual Conference of Nigerian Society for Animal Production*. Pp: 207-209.
- Onyebili, P.A., Ekwu, G.O., Jibike, G.I., Pepple, O.J. and Gbaegbulan, J.O. (1991). Seasonal variation in haematological indices in the grey breasted guinea fowl (*Numida mealagris*). *Nigerian Journal of Animal Production*, 18(2):108-11.
- Susiju, W., Roshitha, N.W., Rajapakse Peramune Veddikkarage Jayanthe Rajapakse, Senanayake Abeysinghe Mudiyanseelage Kularatne. (2013). Does *Carica papaya* leaf extract increase the platelet count? An experimental study in a murine model. *Asian Pacific Journal of Tropical Biomedical*, 3(9):720-724.
- Swati, P., Supriya, S., Rama, B., Shridhar, N. (2013). Evaluation of platelet augmentation activity of *Carica papaya* leaf aqueous extracts in rats. *Journal of Pharmacognosy and Phytochemicals*, 1(5):59.