IMPAIRED HAEMATOLOGICAL PARAMETERS IN CHLORAMPHENICAL INDUCED PANCYTOPENIC RABBITS SUPPLEMENTED WITH *SOLANECIO BIAFRAE* (WÒRÒWÓ) LEAF EXTRACT

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ABSTRACT

Background: *Solanecio biafrae* is a common vegetable cooked as sauce to support pounded yam, semovita in addition to traditional, but no scientific claim in the treatment of pancytopenia (including Anemia).While chloramphenicol is a potent pancytopenia inducing drugs.

Aim: This work was designed to determine effect of ethanolic and aqueous extract of *solanecia biafrae* (wòròwó leaf extracts) in the treatment rabbits induced with pancytopenia using chloramphenicol overdose.

Materials and methods: Fifteen rabbits grouped into A(5 rabbits fed with normal meal and water for 14 days), B1 (5 rabbits administered with 2000mg/kgBW of chloramphenicol orally for 14 days), B2 (5 rabbits treated with 400mg/kgBW of Wòròwó ethanolic extract daily for 14 days after 14days of post chloramphenicol inducement). C1 (5 rabbits given 2000mg/kgBW of chloramphenicol orally for 14 days), C2 (5 rabbits treated with 400mg/kgBW of aqueous extract of Wòròwó daily for 14 days after 14 days of post chloramphenicol inducement. Evaluation of Euglobulin lysis time, Haptoglobin and PCV were carried out using MIDRAY auto hematology analyzer.

Results: The result obtained showed a significant increase in Euglobulin lysis time and Haptoglobin level in rabbits overdosed with 2000mg/kg BW of chloramphenicol for five days (B1 and C1) and decrease in PCV compared with rabbits fed with normal meal and water for five days (A) $p < 0.05$.there was also a significant increase in PCV and decrease in Euglobulin lysis time and Haptoglobin in rabbits overdosed with 2000mg/kgBW chloramphenicol and treated with 400mg/kgBW of aqueous and ethanolic extract of Wòròwó (B2 and C2) compared to when rabbits were overdosed with 2000mg/kgBW of chloramphenicol for fourteen days(C1 and B1) $p< 0.05$.

Conclusion: The study shows that the Supplementation with 400mg/kgBW of *Solanecio biafrae* given for another 14days has increased the PCV, decreased the Euglobulin lysis time and Haptoglobin.

Keywords: Euglobulin lysis time, Haptoglobin, PCV, blood, rabbits.

INTRODUCTION

Lack of study on the specific nutrients and phytochemicals in a large number of the native vegetables species with which Nigeria is richly endowed is partly responsible for their under exploitation especially in areas beyond the traditional localities where they are found and consumed. Of the various classes of phytochemicals, interest has focused on the anti- inflammatory and antioxidant properties of polyphenols found in various botanical agents. Plants vegetables and species used in folk and traditional medicine have gained wide acceptance as one of the main sources of prophylactic and chemo preventive drug discovery and development (Baselt and Ceravey, 2007)

Solanecio biafrae (with local name Wòròwó by Yoruba tribe in Nigeria or bologna in Sierra Leone) belong to a group of vegetables that grow in large quantity as undercover in tree crop plantation.

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The high edible mucilaginous fibre, leaves and stem are used to treat indigestion or as laxative and as purgative (Baselt and Ceravey, 2007). Chloramphenicol is a broad-spectrum antibiotic that was isolated from streptomyces Venezuela in 1947. The drug was subsequently chemically synthesized .it has both a bacteriostatic and bactericidal effect; in the usual therapeutic concentrations it is bacteriostatic. Chloramphenicol is used for the treatment of serious gram- positive, gram –negative anaerobic infections. It is especially useful in the treatment of meningitis, typhoid fever, and cystic fibrosis.

Chloramphenicol has a half-life ranging from 1.6 to 4.6 hours (longer in neonates), with an apparent volume of distribution ranging from 0.2 to 3.1 L/kg (Ambrose 1984, Rajchgot *et al*. 2009). The half-life was longer following oral than following intravenous administration (butler et al. 2010). Patients with chloramphenicol induced bone marrow depression experienced reduced clearance rates. The primary metabolite of chloramphenicol is the glucuronide conjugate.

Chloramphenicol can be toxic and even fatal at acute overdose. Symptoms of poisoning have been associated with nausea and vomiting (especially with oral exposure), metabolic acidosis (an early sign, more common with chronic toxicity), hypotension, hypothermia, abdominal distension, heart failure, cardiovascular collapse and coma. Signs of toxicity may be delayed 5 to 12 hours after overdose. Other factors potentially affecting the toxicity of chloramphenicol include the production of reactive oxygen species, the production of reactive metabolites and genetic susceptibility.

This study aims at investigating the effect of chloramphenicol overdosed and treatment of overdosed group with (Wòròwó) leaf extract on their euglobulin lysis time, Haptoglobin and Pcv. To determine the weight of the animals induced with chloramphenicol overdosed and compared them with their control counterparts. To determine the euglobulin lysis time, Haptoglobin and Pcv in pancytopaenic induced rabbits with overdosed chloramphenicol supplemented with *Solanecio biafrae* (Wòròwó).

The result of this study will give an insight to the antioxidant effect of the vegetable (Wòròwó) and it will also create room for other study most especially on human being, the benefit of the vegetable.

MATERIALS AND METHODS

Study area: This study was carried out at Achievers University animal house, Owo Local Government area of Ondo state in Nigeria.

Study population: Fifteen rabbits were purchased in Owo through the department of Biological Science, Achievers University, Owo - Nigeria and was divided into three groups.

Sample collection: Group A: five milliliter of blood sample was collected from each rabbits after ten days feeding with normal meal and water (normal meal).Group B1 five milliliter of blood sample was collected into Ethylene diamine tetra-acetic acid (EDTA) bottle from each rabbits after five days of overdose with 2000mg/kgBW of Chloramphenicol. Group B2 five milliliters of blood sample was collected into Ethylene diamine tetra-acetic acid (EDTA) bottle from each rabbits after five days of treatment with ethanolic extracts of wòròwó leaf. Group C1 five milliliters of blood sample was collected into Ethylene diamine tetra-acetic acid (EDTA) bottle from each rabbits after five days of overdose with 2000mg/kgBW of Chloramphenicol .Group C2 five milliliters of blood sample was collected into Ethylene diamine tetra-acetic acid (EDTA) bottle from each rabbits after seven days of treatment with aqueous extracts of Wòròwó leaf.

Extracts: Samples of *Solanecio biafrae* (Wòròwó) leaves was obtained from oja-oba market in owo, ondo state Nigeria. *Solanecio biafrae* leaves was dried under shade, it was then milled using a blender.

Aqueous and ethanoic extract of *Solanecio biafrae* (Wòròwó) was gotten from the blended powder. 100g of each vegetable sample was washed with de-ionized water to remove dust particles, the leaves were dried under the shade 3-4 days. The leaves were milled using blender, the powder were soaked in 360ml of ethanol and 240ml of sterile distilled water in ratio 3:2 for 4 days at 30oC – 32Oc.

RESULTS: The result showed a significant increase in Euglobulin lysis time and Haptoglobin in rabbit overdosed with 2000mg/kgBW of chloramphenicol (group B1 and C1) compared with rabbits fed with normal meal and water (group A) $p<0.05$ (table 2)

The result also showed a significant decrease in PCV in rabbit overdosed with 2000mg/kgBW of chloramphenicol (B1andC1) compared with rabbits fed with normal meal and water (group A) $p<0.05$ (table 2)

The result showed a significant decrease in PCV and ELT in rabbits treated with ethanolic extract of *Solanecio biafrae* (group B2 and C2) compared with rabbits fed with normal water and meal (group A) $p< 0.05$ (table 2)

The result obtained also showed a significant decrease in ELT and HP in rabbit overdosed with 2000mg/kgBW of chloramphenicol and treated with aqueous and ethanolic extract of *Solanecio biafrae* (group B2 and C2) compared with rabbits overdosed with 2000mg/kgBW of chloramphenicol (group B1) $p< 0.05$ (table 2)

The result obtained also showed significant increase in PCV in rabbit overdosed with 2000mg/kgBW of chloramphenicol and treated with aqueous and ethanolic extract of *Solanecio biafrae* (group B2and C2) compared with rabbits overdosed with 2000mg/kgBW of chloramphenicol (group B1) $p<0.05$ (table 2)

The result obtained showed a significant increase in ELT and HP in rabbits overdosed with 2000mg/kgBW of chloramphenicol (group C1) compared with rabbits treated with aqueous extract of *Solanecio biafrae* (group (B2)

The result showed a significant increase in PCV in rabbits treated with aqueous extract of *Solanecio biafrae* (group B2) compared with rabbits overdosed with chloramphenicol (groupC1).

The result also showed a significant decrease in ELT and HP in rabbits treated with aqueous extract of *Solanecio biafrae* (groupC2) compared to when the rabbits were overdose with chloramphenicol (group C1) $p<0.05$.

However the result showed a non significant difference in Haptoglobin and Euglobulin lysis time in rabbit overdose with 2000mg/kgBW of chloramphenicol and treated with aqueous extract of *Solanecio biafrae* (group B2) compared with rabbits fed with normal meal and water (group A) $p>0.05$ (table 2).

The result show no significant difference in ELT, HP, PCV in rabbits treated with aqueous extract (group B2) and ethanolic extract of *Solanecio biafrae* (group C2) $p>0.05$.

The result also showed a non significant difference in ELT,HP,PCV in rabbits overdosed with 2000mg/kgBW of chloramphenicol (group B1 and C1) $p>0.05$.

Table 1: ELT, HP, and PCV values of chloramphenicol induced pancytopenia rabbits supplemented with Wòròwó extract and control

Parameters	Group A Rabbit controls	Group B1	Group B2	Group C1	Group C2
ELT (mins)	230±20	340±25.0	250±20.0	348±20.0	261±20.0
Haptoglobin (g/l)	0.48±0.01	1.6±0.02	0.5±0.03	1.7±0.03	0.55±0.02
PCV	34±2.0	18±3.0	30±2.0	19±2.0	30 ±2.0

Table 2: comparison of ELT, HP, PCV of group A and treatment groups

Parameters M±SD		Comparison			P-values
ELT (mins)	230.0± 20.0	CONTROL	340.0±25.0	B1	*0.001
	230.0± 20.0	CONTROL	250.0±20.0	B2	0.153
	230.0± 20.0	CONTROL	250.0±20.0	C1	*0.001
	230.0± 20.0	CONTROL	261.0±20.0	C2	*0.04
HP (g/l)	0.48±0.01	CONTROL	1.60±0.02	B1	*0.001
	0.48±0.01	CONTROL	0.50±0.03	B2	0.195
	0.48±0.01	CONTROL	1.70±0.32	C1	*0.001
	0.48±0.01	CONTROL	1.60±0.02	C2	0.457
PCV	34.0±2.0	CONYROL	18.00±3.00	B1	*0.001
	34.0±2.0	CONTROL	30.00±2.00	B2	*0.013
	34.0±2.0	CONTROL	19.00±2.00	C1	*0.001
	34.0±2.0	CONTROL	30.00±2.00	C2	*0.013

*p-value< 0.05 considered significant when compared with control group

Table 3:Comparison of ELT, HP, PCV of group B1 and treatment groups

Parameters M±SD		Comparison			P-values
ELT (mins)	340.0± 25.0	B1	230.0±20.0	CONTRIL	*0.001
	340.0± 25.0	B1	250.0±20.0	B2	*0.002
	340.0± 25.0	B1	348.0±20.0	C1	0.172
	340.0± 25.0	B1	261.0±20.0	C2	*0.006
HP (g/l)	1.60±0.02	B1	0.48±0.01	CONTROL	*0.001
	1.60±0.02	B1	0.50±0.03	B2	*0.001
	1.60±0.02	B1	1.70±0.3	C1	0.401
	1.60±0.02	B1	0.55±0.20	C2	*0.001
PCV	18.0±3.0	B1	34.00±2.00	CONTROL	*0.001
	18.0±3.0	B1	30.00±2.00	B2	*0.001
	15.0±3.0	B1	19.00±2.00	C1	0.696
	18.0±3.0	B1	30.00±2.00	C2	*0.001

*P-VALUE< 0.05 CONSIDERED SIGNIFICANT WHEN COMPARED WITH GROUP B1

Table 4 : Comparison of ELT, HP, PCV of group B2 and treatment groups

Parameters M±SD		Comparison			P-values
ELT (mins)	250.0± 20.0	B2	230.0±20.0	CONTROL	0.1525
	250.0± 20.0	B2	340.0±25.0	B1	*0.002
	250.0± 20.0	B2	348.0±20.0	C1	*0.001
	250.0± 20.0	B2	261.0±20.0	C2	0.410
HP (g/l)	0.50±0.03	B2	0.48±0.01	CONTROL	0.195
	0.50±0.03	B2	1.60±0.02	B1	*0.001
	0.50±0.03	B2	1.70±0.3	C1	*0.001
	0.50±0.03	B2	0.55±0.20	C2	0.596
PCV	30.0±2.0	B2	34.00±2.00	CONTROL	*0.013
	30.0±2.0	B2	18.00±3.00	B1	*0.001
	30.0±2.0	B2	19.00±2.00	C1	*0.001
	30.0±2.0	B2	30.00±2.00	C2	0.996

*P-VALUE< 0.05 CONSIDERED SIGNIFICANT WHEN COMPARED WITH GROUP B2

Table 5: Comparison of ELT, HP, PCV of group C1 and treatment groups

Parameters M±SD		Comparison			P-values
ELT (mins)	348.0± 20.0	C1	230.0±20.0	CONTROL	*0.001
	348.0± 20.0	C1	340.0±25.0	B1	0.172
	348.0± 20.0	C1	250.0±20.0	B2	*0.001
	348.0± 20.0	C1	261.0±20.0	C2	*0.001
HP (g/l)	1.70±0.03	C1	0.48±0.01	CONTROL	*0.001
	1.70±0.03	C1	1.60±0.02	B1	0.401
	1.70±0.03	C1	0.50±0.03	B2	*0.001
	1.70±0.03	C1	0.55±0.20	C2	*0.001
PCV	19.0±2.0	C1	34.00±2.00	CONTROL	*0.001
	19.0±2.0	C1	18.00±3.00	B1	0.696
	19.0±2.0	C1	30.00±2.00	B2	*0.001
	19.0±2.0	C1	30.00±2.00	C2	*0.001

*P-VALUE< 0.05 CONSIDERED SIGNIFICANT WHEN COMPARED WITH GROUP C1

Table 6: Comparison of ELT, HP, PCV of group C2 and treatment groups

Parameters M±SD		Comparison			P-values
ELT (mins)	261.0± 20.0	C2	230.0±20.0	CONTROL	*0.040
	261.0± 20.0	C2	340.0±25.0	B1	*0.006
	261.0± 20.0	C2	250.0±20.0	B2	0.410
	261.0± 20.0	C2	348.0±20.0	C1	*0.001
HP (g/l)	0.55±0.20	C2	0.48±0.01	CONTROL	0.457
	0.55±0.20	C2	1.60±0.02	B1	*0.001
	0.55±0.20	C2	0.50±0.03	B2	0.596
	0.55±0.20	C2	1.70±0.03	C1	*0.001
PCV	30.0±2.00	C2	34.00±2.00	CONTROL	*0.013
	30.0±2.00	C2	18.00±3.00	B1	*0.001
	30.0±2.00	C2	30.00±2.00	B2	0.996
	30.0±2.00	C2	19.00±2.00	C1	*0.001

*P-VALUE< 0.05 CONSIDERED SIGNIFICANT WHEN COMPARED WITH GROUP C2

DISCUSSION

The results obtained showed a significant increase in Euglobulin lysis time and Haptoglobin in rabbits overdosed with 2000mg/kgBW of chloramphenicol (GROUP B1 and C1) compared to rabbits fed with normal meal an water (group A)with P-<0.05.The increased ELT AND HP could be attributed to chloramphenicol overdose. Haptoglobin is a positive acute phase protein hence it increases during chloramphenicol overdose. The increased ELT time can occur as a result of thrombocytopenia. Chloramphenicol may cause bone marrow suppression during treatment this is a direct toxic effect of the drug on human mitochondria (Yunis 1989) chloramphenicol induced pancytopenia causes the elevated level of HP and ELT.

The result also showed a significant decrease in PCV in rabbit overdosed with 2000mg/kgBW of chloramphenicol (GROUP B1 and C1) compared with rabbits fed with normal meal and water(GROUP A) with P-<0.005. the decreased level of PCV in rabbits overdose with chloramphenicol occurs as a result of bone marrow suppression. The most serious side effect of chloramphenicol is aplastic anemia (Wallerstein *et all.,* 1969). Hematological side, chloramphenicol induced bone marrow depression are the most significant adverse reaction (Farber and Brody, 1989). Bone marrow suppression results in low red cell production causing low Pcv.

The result obtained also showed a significant decrease in ELT and HP in rabbit overdose with 2000mg/kgBW of chloramphenicol and treated with aqueous and ethanolic extract of *Solanecio biafrae* (Group B2 and C2) compared with rabbits overdosed with 2000mg/kgBW of chloramphenicol (groupB1 and C1) P-<0.05

The increased level of PCV and decreased level of ELT and HP could be associated with phytochemicals present in *Solanecio biafrae*, the antioxidant constituent of its leaves.

The leaves are rich in vitamin A, B-group (folic acid, thiamine, niacin, riboflavin), C and E, and minerals. It is also rich in iron and potassium. The vitamin B is important in production of red blood cells. This could also be associated with the scavenging property of solanecio biafrae as reported by Olaniyan (2007) as *Solanecio biafrae* contains phytochemicals such as tocopherols, the potassium, iron, vitamin A,C and E (Christopher,2003; Burkil,2004;Torimiro *et al*.., 2013; Olaniyan 2017).

CONCLUSION

A successful inducement of pancytopenia with the administration of 2000mg/kgBW of chloramphenicol for 14days has increased in Euglobulin lysis time, Haptoglobin, and decrease in PCV. Supplementation with 400mg/kgBW of *solanecio biafrae* for another 14days has increased the PCV, decreased the Euglobulin lysis time and Haptoglobin.

RECOMMENDATION

Further research should be carried out on dosage appropriation of *Solanecio biafrae*

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