

*Full Length Research Paper*

# The effect of extracts of *Crinum jugas* on the acute toxicity of the *Vernonia amygdalina* root poisoned guinea pigs

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The toxicity of *Vernonia amygdalina* root and enzymatic activities of *Crinum jagus* extracts on guinea pigs were investigated. The cold water, n-hexane, ethyl acetate and methanol extracts were used to evaluate the effect of VA root poison on the aspartate transaminase, alanine transaminase and alkaline phosphatase enzymes activities in the serum/liver of guinea pigs. No death of guinea pigs were recorded neither in the control nor in the extracts treated groups during the observation period. Visual observations of guinea pigs were made 1 and 2 h after poison and extracts administration respectively, including changes in respiration, motility, behavioural pattern, food and water consumption and recorded systematically. These parameters changed in groups 2, 3, 4, 5 and 6 guinea pigs compared to the control Group 1, 2 h after poison administration and recovered to normal in groups 3, 4, 5 and 6 after extracts administration. The pathological examination of the liver showed no significant abnormality in groups 1, 4, 5 and 6 while the enzymes in group 3 were inactive and in group 2, the enzymes of the only surviving guinea pig was found to be dead.

**Key words:** *Crinum jagus*, enzyme activity, aspartate transaminase, alanine transaminase, alkaline phosphate.

## INTRODUCTION

The use of plants to treat ailments is as old as antiquity. Records of humans using plants to treat diseases have been recorded as far back as 6000-4000 years ago when Agurvedic physicians started treating tumors with extracts from *Vinca roseus* (Ogunyemi, 1979). The importance of plants in medicine remains even of greater relevance with the current global shift to obtain drugs from plant sources, as a result of which attention has been given to

the medicinal value of herbal remedies for safety, efficacy and economy (Glombitza et al., 1993).

Today natural products derived from plant are being tested for presence of new drugs with new methods of pharmacological action. A special feature of higher plants is their capacity to produce a large number of secondary metabolites (Castello et al., 2002). Recent studies are involved in the identification and isolation of new

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therapeutic compounds of medicinal importance from higher plants for specific diseases (Erturk et al., 2006).

*Crinum jagus* (Amaryllidaceae) is a bulbous plant with freshly, wide spreading rich green and glaucous leaves reading 75 cm long by 6cm wide. It grows well in damp site and is distinctly ornamental. The plant attracts considerable attention due to various medical properties as anti-tumor, immuno- stimulating, analgesic, anti-viral, anti-bacterial, anti-fungal and memory loss and other mental symptoms associated with ageing using the in situ bioautographic test for enzyme inhibition (Houghton et al., 2004; Burkill, 1985).

Augustine and Lycorine isolated from this plant showed moderate anti-malarial activity against plasmodium falciparum but the selectivity was very low compared to anti-malaria control compounds (Ghosal et al., 1985; Tran et al., 2003). Some members of the family also contain pharmacologically active chemical compounds, Crinamine from *C. jagus*, possessed strong anti-bacterial activity, while lycorine hamayne and 6-hydroxycrinamine were inactive (Adesanya et al., 1992). Crisisine from bulb of *Crinum asiaticum* was also an effective insecticide (Tram et al., 2002). Ethnobotanical study (Ogunkunle and Olapade, 2011) of the plant revealed its potency in the treatment of asthma and related coughs.

## MATERIALS AND METHODS

### Plant extract and phytochemistry

The bulbs of *C. jagus* were collected from Oyofo-Oghe Ezeagu L.G.A., Enugu State Nigeria in August 2011. The bulbs of the plant were shredded and sun dried for three weeks and crushed. The identity of the plant was confirmed by Prof. J. C. Okafor of Department of Applied Biology and Biotechnology, Enugu State University of Science and Technology, Enugu – Nigeria. About 53.8 g of the powdered plant bulb was successively extracted with n-hexane, ethyl acetate and methanol. After extraction, the extract was evaporated to dryness under reduced pressure using a rotary vacuum evaporator. Phytochemical screening of the crude extracts was carried out using standard methods described elsewhere (Sofoware, 1993, Trease and Evans, 2002, Perinos and Quinby, 1967). Each plant extract was screened for the presence of different classes of compounds including saponin, saponin glycoside, steroid/triterpenoids, glycoside, anthracenes, digitals glycoside, tannins, pseudo tannins, flavonoids, resins, alkaloids and volatile oils.

### Plant extract preparation

Exactly 150 cm<sup>3</sup> of each extract was evaporated at reduced temperature and the result residue was dissolved (macerated) in distilled water (75 mg/ml) before oral administration to the guinea pigs.

### Animal grouping

One hundred and twelve guinea pigs weighing 800-1053 g were bought from Zoology Department, University of Nigeria Nsukka, Nigeria. The guinea pigs were kept in a well ventilated house

conditions (temperature: 27-30°C) and fed for three days with sunrise feeds and tap water. They were housed in plastic cages of dimension 165 cm x 101 cm x 96 cm with cleaning done before each meal. They were distributed into six groups of seven guinea pigs. This include one control (group A), poisoned only (group B), poisoned and dose with cold water extract (c), with n-hexane extract (D), with ethyl acetate extract (E) and methanol extract (group F) respectively for Aspartate transminante, Alanine transaminante and Alkaline phosphates.

### Poisoning and treatment of animals

Guinea pigs in group A were administered orally with 1 cm<sup>3</sup> of distilled water respectively. While guinea pigs in groups B, C, D, E and F were administered orally with 1 cm<sup>3</sup> of "food poison (prepared using the tap roots of bitter leaf – *Vernonia amygdalina* (1 g/100 cm<sup>3</sup> in distilled water). After 1 h of administration of poison groups C, D, E, and F were given 3 cm<sup>3</sup> each of (anti-poison) (75 mg/ml) in distilled water of n-hexane, ethyl acetate, methanol and cold water extracts of crinum jagus respectively for aspartate transminante, Alanine transminante and alkaline phosphates.

### Enzyme assays (determination of enzyme activities)

The effects of the extracts of *C. jagus* on the acute toxicity of the *V. amygdalina* poison on the guinea pigs (Table 1). During the observation period, no death of guinea pigs was neither recorded in the control group A nor in the treated groups of C, D, E and F. visual observations of rats were made and recorded systematically 1 and 2 h after poisoning and extract administration, including respiratory, behavioral pattern, food and water consumption. Only one out of the 7 guinea pigs in group B survived. The pathological examination of the liver showed no visual abnormality in groups A, D, E and F while the enzymes in group C were inactive and in group B, the enzymes of the only surviving guinea pig was found to be dead.

## RESULTS AND DISCUSSION

The results of the various extracts of *C. jagus* on different liver biochemicals of poisoned guinea pigs were present in Table 2. An increase in the biochemicals assayed was noticed only in the group (c) from the control Group A. the only surviving guinea pig in Group B showed a significant decrease in the biochemicals assayed below the reference (standard) range (AST, 5-18, ALT, 3-12 and ALP, 15-92) indicating that the biochemical are dead. Groups D, E and F showed results within the reference range with only alkaline phosphate biochemical having readings within that of the control. This shows that the extracts of n-hexane, ethyl acetate and methanol of *C. jagus* is effective in normalizing the effect of the poison in guinea pigs or the liver injuries due to the poison is minimized may be due to the enzyme regeneration capacity of the extracts. Visual observation of the guinea pigs 1 and 2 h after poison and extracts administration, including changes in respiration, behavioral pattern, and food and water consumption. These parameters changed in Groups B, C, D, E and F in after the administration of the poison and reversed 2 h after the administration of

**Table 1.** Results of phytochemical screening of *C. jagus* plant bulb.

Saponin	+	-	-
Saponin glycoside	+	-	-
Steroid/triterpenoid	-	+	+
Glycoside	-	-	+
Digitalis glycoside	-	+	+
Anthracene	-	-	-
Tannins	-	-	+
Hydrolysable tannins	+	-	-
Pseudo tannins	-	-	-
Flavonoids	-	-	-
Resins	-	-	-
Alkaloids	-	-	-
Volatile oils	-	-	-

**Table 2.** Effect of extracts of *C. jagus* on different liver biochemical parameters of guinea pigs in international unit per liter (IU/L).

Groups	Doses administered (cm <sup>3</sup> ) Extracts					AST (1 UL <sup>-1</sup> )	ALT (1 UL <sup>-1</sup> )	ALP (1 UL <sup>-1</sup> )
	Poison	CWE	HE	EAE	ME			
A	0	0	0	0	0	18.12± 0.29	7.01±0.20	32.37±0.17
B	1	0	0	0	0	1.02	0.47	7.39
C	1	3	0	0	0	20.11±0.20	13.29±0.23	32.19±0.22
D	1	0	3	0	0	9.14±0.26	7.18±0.18	28.23±0.20
E	1	0	0	3	0	5.44±0.24	3.39±0.11	32.41± 0.20
F	1	0	0	0	3	15.33±0.26	5.29±0.16	59.28±0.17

Key: CWE – Cold Water Extract; HE – n-hexane extract; EAE – ethyl acetate extract; ME – methanol extract; AST – Asparate transaminante; ALT – alanine transanimante; ALP – alkaline phosphatase; IU/L<sup>-1</sup> – International unit per liter.

the extracts in Groups C, D, E and F just as in the control Group A.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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