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Research Article

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Effect of *Vinca minor* on biochemical parameters using Wistar albino rats

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ABSTRACT

Effect of *Vinca minor* on biochemical parameters using Wistar albino rats was investigated to ascertain the plant`s haematotoxicity, liver and kindey tissue damage potential. Haematological indices and markers of liver and kidney for cellular integrity were monitored in rats given different concentrations of leaf extract of *V.minor*. Results obtained showed significant reduction ($p<0.05$) in PCV and Hb of test rats against the control. Test rats also had significant increase ($p<0.05$) in liver enzymes and marked significant ($p<0.05$) reduction in urea and some electrolytes in test rats when compared to control. The loss of integrity of the liver cells, retention of the urea and some electrolytes in the kidney would certainly lead to a possible disease condition with time. This study has shown the effect of *V.minor* on biochemical parameters using Wistar albino rats.

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INTRODUCTION

Due to known effects and cost implication of synthetic drugs, plants still occupy important position in the treatment of different illness [1-4]. They still remain the natural source of so many active ingredients used in the production of drugs. Different authors have noted that secondary metabolites of plants have different uses in traditional and modern medicine [5-8]. The increase in demand for herbal preparations may have followed the recent revolution and growing interest in the use of plant based medications in the treatment of variety of disease conditions [9-16]. In Nigeria for instance, the exclusive use of herbal preparations or drugs in the management of certain ailments is now common [9,12,15,7]. In herbal preparations, different plants are employed separately or in combined form [15,17].

Vinca minor commonly known as lesser prewinkle, dwarf prewinkle, myrtle or creeping myrtle, is amongst those plants used for herbal preparation either separately or in a combined form with other plants of herbal importance. It belongs to the plant family Apocynaeceae, and is one of the most popularly used ground covers [18]. The aerial part of *V.minor* is the effective part of the plant. The plant is known to house important alkaloid and tannin phytochemicals [18-19]. Amongst its alkaloids is the pharmacologically toxic and active vincristine, which has been implicated in neurological and cytotoxic effects responsible for liver and kidney damage [19], and also for the treatment of cancer [19]. It is externally used for sore throats, nosebleeds, bruising, abscesses, eczema and stop bleeding [18-19]. Some of its useful alkaloids also have potential for neurological disease treatment as well [19-21].

In recent years, research interests on plants as food materials [22-35], or in relation to their potency against diseases are mostly on their usefulness and how such usefulness can be effectively utilized. Not much has been done to investigate the possible inherent toxicity associated with the use of preparations from plants. The present study aimed at that and investigated the effect of *V. minor* on biochemical parameters using Wistar albino rats as a case study.

MATERIALS AND METHODS

Collection of Plant Materials, Preparation of extract and Acute Toxicity Study

The plant material used in this study were collected from Rhema University compound and were identified by a Botanist in the Department of Plant Science and Biotechnology, Imo State University, Owerri, Nigeria as *V. minor*. The identified *V. minor* leaves were collected, air dried and crushed with pestle and mortar, then sieved to obtain the coarse powder. The leaf extract was prepared following as described Ugbogu *et al.* [36].

Experimental Animals

Thirty albino rats of Wistar strains weighing between 80-120 g were purchased from the animal colony of Department of Biochemistry, Abia State University, Uturu, Nigeria. The rats were allowed to acclimatize in their new environment for four days before they were used for studies. All the rats passed for acute toxicity as described Ugbogu *et al.* [36], and the toxic dose of the leaf extract was found to be well above 10,000 mg/kg body weight. After acute toxicity study, a total of twenty rats were weighed and separated into four groups (control and groups I-III) of five rats per group. The water and feeds were given *ad libitium*. The rat feed was a brand of commercial grower freshly obtained from a feed dealer along Abayi road, Aba. The rats were placed on different concentrations of the prepared aqueous leaf extract of *V. minor* daily for 28 days.

Treatment given to the rats are as follows
Control: The control was given feed and water.
Group I: The rats in this group were given 150 mg/kg of aqueous leaf extract, feed and water.
Group II: Rats in group II were given 400 mg/kg of aqueous leaf extract, feed and water
Group III: Rats in group II were given 750 mg/kg of aqueous leaf extract, feed and water.

Collection of Blood Samples

After twenty-eight days of feeding the rats with the aqueous leaf extracts of *V. minor*, the collection of blood samples were done as explained previously [36].

Haematological and serum chemistry analysis was done by following previous methods [37-38].

Statistical analysis: Results were presents as mean and standard deviation of triplicate determinations. Significant difference was established using least significant difference (LSD) at $p<0.05$.

RESULTS AND DISCUSSION

The results are presented in Tables 1-3. PCV and Hb levels of test rats (Groups I-III) reduced significantly ($p<0.05$) against the control. Haematological assessment is important in routine clinical evaluation of state of health [38-41]. Different authors [15,40-41] have attributed assessment of haematology to explaining blood relating functions as well as the extent of deleterious effect of extract of plant or its products in blood. The relation between PCV and Hb as noted by different authors [8,32-34] was also maintained in the present study. The reduction in Hb could be attributed to reduction in PCV of rats in the present study. Levels of WBC in test rats increased significantly ($p<0.05$) when compared to control. Aside the Eosinophil levels that increased significantly ($p<0.05$) in only test groups II-III, levels of Neutrophil, Lymphocyte, and Monocyte significantly ($p<0.05$) increased test rats when compared to control whereas the platelets reduced significantly ($p<0.05$) in test groups II and III rats when compared to control. WBC and its differentials are noted for their ability to protect the body against disease causing substances [23-24, 42-47,50]. Duru *et al.* [24], Olson *et al.* [48], and Duru *et al.* [49] reported related results which supports our findings.

AST, ALT and ALP levels of group I rats increased insignificantly ($p>0.05$) against the control. AST, ALT, and ALP levels of rats in groups II and III increased significantly ($p<0.05$) when compared to control. It could be that *V. minor* was not able to induce damage to the liver of test rats at a lower dosage. However, its toxicity increased at a higher doses as observed in groups I and II rats. According to Enermor *et al.* [51], small increase in ALT and AST might be due to the wide range of liver disease. Rise in ALT level is normally followed by a rise in AST level. Primary and secondary tumors bring about elevation of both enzymes with AST being higher than ALT [52]. Different authors have noted that ALT is more liver specific than AST and its rise in the plasma designates compromise in the integrity of the liver. The observed rise in the levels of ALT in the test rats in this study could ben evidence of hepatoxicity caused by the extract made from *V. minor*.

Table 1: Haematological results of rats given *V.minor*

Parameters	Control	Group I	Group II	Group III	LSD
PCV (%)	40.61 ± 3.09^{b}	36.11 ± 2.05^{a}	35.63 ± 1.60^{a}	35.68 ± 2.40^{a}	3.37
Hb (g/dl)	13.31 ± 0.99^{b}	12.02 ± 0.44^{a}	11.57 ± 0.34^{a}	11.41 ± 2.28^{a}	1.11
WBC($\times10^{3}$ul)	5.13 ± 3.16^{a}	8.95 ± 0.97^{b}	9.14 ± 0.55^{c}	9.05 ± 0.47^{bc}	0.12
Eosinophil (%)	0.38 ± 0.01^{a}	0.43 ± 0.03^{a}	0.65 ± 0.02^{b}	0.68 ± 0.01^{b}	0.13
Neutrophil (%)	1.02 ± 0.02^{a}	1.85 ± 0.20^{b}	1.94 ± 0.04^{b}	1.90 ± 0.05^{b}	0.11
Lymphocyte (%)	64.71 ± 0.75^{a}	70.04 ± 0.81^{b}	77.19 ± 1.60^{c}	72.34 ± 3.06^{b}	3.03
Monocyte (%)	0.37 ± 0.01^{a}	2.00 ± 0.35^{b}	1.90 ± 0.45^{b}	1.72 ± 0.45^{b}	0.39
Platelets($\times10^{3}$ul/)	178.90 ± 3.47^{b}	176.77 ± 3.25^{ab}	174.48 ± 2.51^{a}	176.07 ± 3.18^{a}	2.66

Results are mean and standard deviations of five determinations. Values with similar alphabet in the same row are statistically significant ($p<0.05$). PCV-Packed Cell Volume; Hb=Haemoglobin; and WBC=White Blood Cell

Table 2: Liver enzyme results of rats given *V.minor*

Parameters	Control	Group I	Group II	Group III	LSD
AST (u/l)	77.33 ± 1.26^{a}	78.30 ± 1.01^{a}	91.16 ± 1.84^{b}	93.69 ± 2.38^{c}	2.44
ALT (u/l)	73.72 ± 1.00^{a}	73.35 ± 2.15^{a}	78.67 ± 1.72^{b}	79.99 ± 1.20^{b}	2.28
ALP (u/l)	34.92 ± 0.13^{a}	36.73 ± 0.29^{a}	42.10 ± 3.86^{b}	49.56 ± 3.57^{b}	2.76

Results are means and standard deviations of five determinations. Values with similar alphabet in the same row are statistically significant ($p<0.05$). AST=Aspartate aminotransferase; ALT=Alanine aminotransferase; and ALP=Alkaline phosphate

Table 3: Kidney function result of rats given *V.minor*

Parameters	Control	Group I	Group II	Group III	LSD
Creatinine (mg/dl)	0.80 ± 0.01^{b}	0.81 ± 0.10^{b}	0.74 ± 0.01^{a}	0.79 ± 0.03^{ab}	0.06
Urea (mg/dl)	47.10 ± 1.91^{c}	37.56 ± 0.29^{b}	35.79 ± 2.03^{b}	32.68 ± 1.55^{a}	2.76
Na+(mg/dl)	142.17 ± 2.50^{d}	135.17 ± 2.45^{c}	103.72 ± 2.00^{b}	99.59 ± 2.72^{a}	3.56
K+(mEq/L)	5.06 ± 0.07^{a}	5.76 ± 0.94^{b}	5.24 ± 0.13^{a}	5.22 ± 0.78^{a}	0.31
HCO_3^- (mmol/L)	29.62 ± 2.99^{b}	27.18 ± 1.14^{a}	29.32 ± 2.48^{b}	29.98 ± 1.85^{b}	1.14
Cl-(mEq/L)	100.56 ± 3.47^{d}	86.14 ± 2.25^{b}	88.19 ± 3.04^{c}	84.36 ± 2.35^{a}	1.61

Results are means and standard deviations of five determinations. Values with similar alphabet in the same row are statistically significant ($p<0.05$). Na^+, Sodium ion; Cl^-, Chloride ion; K^+, Potassium ion; and HCO_3^-, Bicarbonate

Creatinine decrease in test group II rats was significant ($p<0.05$) when compared to control. Those of groups I and II were insignificantly ($p>0.05$) affected against control. Urea in test rats in the present study, reduced significantly ($p<0.05$) when compared to control. This observation could mean possible severe kidney disease in future by the extract. The observed levels of Na^+ and Cl^- reduced significantly ($p<0.05$) in test rats when compared to control. There was observe increase in K^+ and decrease in HCO_3^- of test group I rats against the control. Levels of K^+ and HCO_3^- were insignificantly affected ($p>0.05$) intest groups II and III rats when compared to control.

Rats placed on different doses of leaf extract of V. *minor* showed marked slight change in Hb and PCV levels, marked change in liver enzymes with possibility of severity in renal indices with time. The observed changes were dose dependent. There is need for an extensive study on toxicity of the studied plant due to its herbal importance. This study has shown the effect of V*inca minor* on biochemical parameters using Wistar albino rats.

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