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INTERNATIONAL JOURNAL OF CURRENT RESEARCH

International Journal of Current Research
Vol.9, pp.010-013, October, 2010

ISSN: 0975-833X

RESEARCH ARTICLE

CHANGES IN SOME BIOLOGICAL PARAMETERS AND SERUM LIPIDS IN ALBINO RATS FED 40% *Vernonia amgdalina* (Del) And *Vernonia colorata* (Willd) Incorporated Diets

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ARTICLE INFO

Article History:
Received 17th August, 2010
Received in revised form
12th September, 2010
Accepted 23rd September, 2010
Published online 1st October, 2010

Key words:

Vernonia amygdalina,
Vernonia colorata,
Relative organ weight,
Cholesterol,
Triacylglcerol

ABSTRACT

The effect of 40% dietary incorporation of *Vernonia amygdalina*.Del and *Vernonia colorata*. Willd on body weight, vital organ weights, serum cholesterol and total triacylglycerols were studied in albino rats. Percentage relative liver weight increased from 2.92 ± 0.26 in control group to 3.48 ± 0.61 and 3.83 ± 0.53 rats fed 40% *Vernonia amydalina* .Del and *Vernonia colorata*. Willd. Percentage relative intestinal weight increased non-significantly (P≤0.05) from 7.34 ± 0.42 in control group to 8.65± 0.74 and 12.22 ± 1.17 in 40% *Va* and *Vc* groups respectively. Percentage relative kidney weight increased significantly from 0.60 ± 0.06 in control group to 0.87 ± 0.16 in 40% *Vc* incorporated diet group while there was no significant change in 40 % *Va*. Percentage relative pancreatic weight showed no significant changes. Weight gain/ loss over the 21 day period was 17.50 ±3.78, -18.04 ± 4.01, and -41.88 ± 6.21 in the control ,40% *Va* and 40% *Vc* respectively. Serum cholesterol decreased significantly form 197.65± 70.64 in control group to 115.20 ± 26.16 in 40% *Vc* fed group. There was also a significant decrease in total serum triacylglycerol in the groups receiving 40% *Va* and 40% *Vc* incorporated diets. These findings are indicative that dietary incorporation *Vernonia amygdalina* .Del and *Vernonia colorata*. Willd may reduce body weight, serum cholesterol and total triacylglcerol.

INTRODUCTION

Vernonia amygdalina and *Vernonia colorata* are species from the genus *Vernonia.* They are shrubs that grow 2-5meters in height (Bonsi *et al.,* 1995). Their leaves are green with characteristic odour and bitter taste. *Vernonia colorata* is less is less bitter than *Vernonia amygdalina* and is often eaten unprocessed though amateurs may be unable to distinguish the two species by visual inspection. *Vernonia* species grow in a wide range of ecological zones in Africa. It is drought tolerant and is often planted as gardens and hedges around homesteads.

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Extracts from *Vernonia amydalina.* Del have been shown to possess anti-malarial and anti-microbial potentials (Abosi and Raseroka, 2003, Akinkpelu,1999 , Ijeh *et al.,* 1996). Methanolic and ethanolic extracts of *Va* have also been demonstrated to have hypoglycaemic and hypolipidaemic effects in animal models (Akah and Okafor, 1992, Adaramoy *et al.,* 2008, Nwanjo 2005). Administration of aqueous extracts of *Va* were reported to have anti-hepatotoxic potentials against Carbon tetra chloride induced hepatic damage in rats (Arhoghro *et al.,* 2009). Methanolic extracts of Va have been demonstrated to confer protection against radiation induced hepatic damage in rats exposed to gamma

radiation. (Adaramoye *et al.,* 2008b). Dietary incorporation of *Va* has been shown to confer protection against aflatoxin B_1 induced hepatic damage in albino rats (Ijeh and Obidoa , 2004). Aqueous extracts of Va infused intragastrically at a dose of 10mg/ml induced a significant increase in gastric secretions well as dose dependent contraction of guinea pig ileum at a dose range of 0.6mg/ml to 66mg/ml (Owu *et al.,* 2008b). *V. amygdalina* (Va), potently retards the proliferative activities of ER+ human breast cancerous cells (MCF-7) *in vitro* in a concentration-dependent fashion (Yedjou *et al.,* 2008). The exposure of BT-549cells to increasing concentrations of VA (10, 100, and 1000 µg/mL) inhibited cell growth by approximately 14 % ($P<0.05$), 22 % ($p<0.05$), and 50 % ($p<0.005$) respectively. The cell count studies were corroborated by DNA synthesis studies. Treatments of BT-549 with 10, 100, and 1000 µg/mL *Va* inhibited DNA synthesis in a concentration dependent fashion by 22 %, 76 % ($P<0.05$), and 86 % ($p<0.01$) respectively. Extracts of *Va* have also been reported to possess analgesic and antiplasmodial activity in mice (Njan *et al.,* 2008). These reports establish to a large extent the scientific basis for the many uses of *Vernonia amygdalina* in ethnomedicine. There are however few reports on the possible effects of high level of dietary incorporation of *Vernonia amygdalina* and *Vernonia colorata* on vital body organs. There is also the need to establish whether the effects reported using extracts are reproducible when whole leaves are incorporated in diet quantities comparable to those used in obtaining median those extracts. The present study investigates the effect of 40% dietary incorporation of two vernonia species on body, organ weights and some serum lipids in albino rats.

MATERIALS AND METHODS

Plant materials

The fresh leaves of *Vernonia amygdalina*. Del and *Vernonia colorata*. Willd were collected from a local garden farm at Old Umuahia, in Abia State Nigeria. Botanical identity was confirmed at the Botany unit of the Department of Biological Sciences, Michael Okpara University of Agriculture Umudike, Umuahia Abia State, Nigeria by Mr G.C Osuagwu. Fresh leaves of the plant were sorted to remove senescent leaves as well as debris. It was then washed without squeezing to avoid juices loss and air dried at room temperature for one week under a fan until constant weight was obtained. The dried leaves were milled using a clean stainless steel manual mill to obtain a coarse powder

Animals

Adult male albino (12) rats aged 8-12wks were purchased from the animal housing unit of the Faculty of Veterinary Medicine University of Nigeria Nsukka, Nigeria. They were housed in stainless steel rat cages in the animal housing unit of the College of Natural and Applied Sciences MOUAU. The animals were maintained at room temperature under humid tropical conditions and exposed to 12 hour light/dark cycles.

The animals were allowed 7days of equilibration on standard growers feed supplied by Pfizer Nigeria ltd. Feed and water were supplied *ad libitum* throughout the study.

Experimental Design

After equilibration the animals were separated into 3 groups of 4 animals each. *Group 1* which served as control group was fed on the standard growers mash only. *Group 11* and *111* which served as the experimental groups had Va and Vc incorporated into their diets in a ratio of 40:60 (*Va/Vc* to standard feed). The standard feed was milled, mixed thoroughly with the powdered/milled leaves and pelleted using an improvised syringe whose end was cut to allow small pellets out. Animals were weighed at 48 hourly intervals over the 21 day period of feeding on the experimental diet. At the end of the feeding period animals were weighed and sacrificed by dazing and blood collected by cardiac puncture. The blood was allowed clot and serum separated after centrifugation. They were then dissected and organs collected and weighed using a Satorius top loading balance.

Determination of relative organ weight

This was done by multiplying the ratio of organ weight to weight of each animal on day of sacrifice by a factor of hundred.

Biochemical analysis

Determination of total cholesterol was done by enzymatic colorimetric method as described by Allain *et al.,* 1974, using standard assay kits supplied by Randox Co UK. Total triacylglycerols were determined using the enzymatic colorimetric method as modified by Fossati and Principe (1982).

Statistical analysis

Data obtained were analysed using Student's t-test to determine statistically different samples at 95% confidence level.

RESULTS

Our results as shown in figure 1.0 shows the effect of 40% dietary incorporation of *Vernonia amygdalina* and *Vernonia colorata* on relative liver and intestinal weights in wistar albino rats. Liver weights increased non significantly ($P\geq0.05$) in the *Va* and *Vc* fed groups.

While intestinal weights increased significantly (P≤ 0.05) in the 40% *Vc* fed group increases in the 40% *Va* fed groups was not statistically significant. Relative kidney increased significantly (P≤ 0.05) in the 40% Vc fed group. (Fig. 2) Feeding of the two Vernonia species did not result in any significant changes in pancreatic weight. While the control group gained weight significantly the groups fed 40% Va and Vc diets lost weight significantly (Fig. 3). Blood Cholesterol and triacylglycerol level were significantly reduced in the test groups administered 40% Va and Vc.

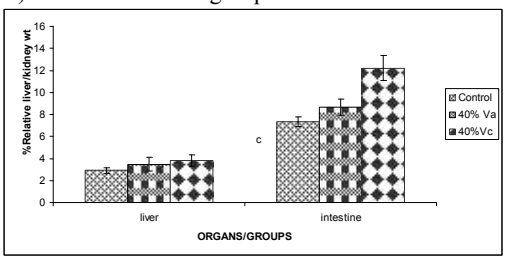

Fig. 1. Relative liver and intestinal weights of rats fed diets incorporated with 40% *Vernonia amygdalina*.del and *Vernonia colorata*

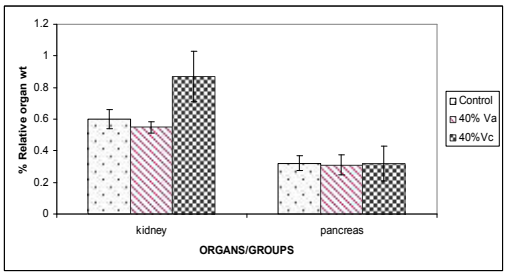

Fig.2. Relative kidney and pancreatic weights of rats fed diets incorporated with 40% *Vernonia amygdalina*.del and *Vernonia colorata*

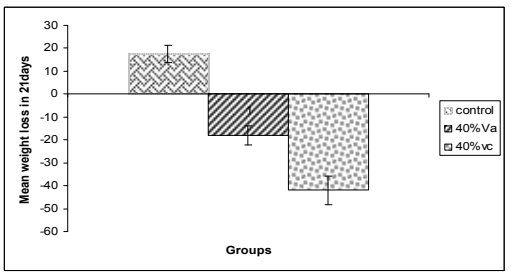

Fig. 3. Mean weight gain/loss of rats fed diets incorporated with 40% *Vernonia amygdalina*.del and *Vernonia colorata*

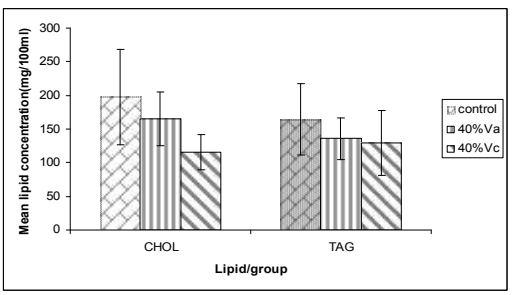

Fig. 4. Mean cholesterol and total triacylglycerol concentrations in rats fed diets incorporated with 40% *Vernonia amygdalina*.del and *Vernonia colorata*

DISCUSSIONS

Several workers have reported conflicting results on the effect of *Vernonia amydgalina* extracts on vital organs especially liver. A no of these reports are indicative that the administration of *Va* amygdalina extracts may be hepatoprotecive (Arhoghro *et al.,* 2009, Adaramoye *et al.,* 2008, Ijeh and Obidoa, 2004). Incorporation of the leaves into mice diet at 25% resulted in enlarged intestines (Igile *et al.,* 1995). Our present findings are indicative that even at 40% dietary incorporation significant changes in liver weight were not observed. Indicating that the enzyme induction which has been reported by several workers (Ijeh and Obidoa, Adaramoye *et al.,* 2008), may not be sufficient may not be sufficient to result in significant changes in liver morphology. The main argument against the increasing reports of medicinal potentials of Va has been the concern about reproducibility of these effects in individuals feeding the plants at very high quantities akin to those used in preparation of doses found to give medicinal benefits. The reports of Igile *et al.,* (1995) using mice which have smaller body mass may not be reproducible in higher animal models as seen in the effect of 40% dietary incorporation in adult rats used in this study. Our findings on the effect of the vegetable diet on intestinal and kidney weight this indicates the need to process *Vernonia colorata* which is often eaten without processing because it is much less bitter than *Vernonia amygdalina* appear to have more significant effect on relative weights of these organs which could be indicative of some deletrious effects on these organs. This indicates the need for process of *Vernonia colorata* to possibly reduce the toxic constituents before eating. Our present findings confirm earlier reports indicating incorporation of *Va* into diets as well as administration of its extracts result in body weight loss. Our results in figure 3.0 however also indicate that *Vc* though not traditionally used in weight reduction because it is less bitter, resulted in a higher degree of weight loss. Indicating that the factors responsible for weight loss may not solely reside in the bitter principle as has been suggested by several workers (Akah and Okafor 1992, Ijeh and Obidoa,2001). This suggests the need to further

investigate the effects of *Va* and *Vc* as well as their components on body fat cells.

Our findings as shown in figure 4 indicate that *Va* is a more potent hypolipidaemic agent that *Vc* indicating that the several reports in recent times on blood lipid lowering effects of *Va* extracts could be reproducible in individuals using *Va* in soups and porridges as part and parcel of diet not necessarily as medicine indicating possible reduction in predisposition to cardiac disease.

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