Effects Of Both Ethanol And Water Extracts Of Buccholzia Coriacea On Sodium Arsenite Induced Liver Damage In Male Albino Rats.

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Abstract: The hepatoprotective effects of two extracts (alcoholic extract and water extract) obtained from the air dried seeds of Buccholzia coriacea were investigated. Sodium arsenite is shown to elicit strong mutagenic activity and hepatotoxicity. This work therefore seeks to induce liver damage in rats using a single dose (10 mg/kg i.p) of sodium arsenite and to evaluate the possible protective effects of oral administration of different doses of 100, 200, 300, and 400mg/kg of both water and alcoholic extracts of Buccholzia coriacea seeds on sodium arsenite induced liver damage. Rats were pretreated with 100, 200, 300, and 400mg/kg of the extracts for five days before a single dose of Na_2AsO_3 (10mg/kg) on the sixth day. The alanine aminotranferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and lactate dehydrogenase (LDH) activities were determined in serum and tissue of rats. Sodium arsenite caused liver damage as evident by statistically significant ($p < 0.05$) increased in serum and tissue activities of ALT, AST, ALP and LDH. However, all the tested plant extracts elicited counter effect at dose dependent manner. The present results suggest that Buccholzia coriacea can act as hepatoprotective against liver damage.

Keywords: Alcoholic, Hepatoprotective, Hepatotoxicity Mutagenic,,.

1.0 INTRODUCTION

Due to alarming increase in the incidence of alcohol- and drug- related liver damage [1], [2]. This study focuses on the remedies for liver damage through the use of natural plant which contain bioactive ingredients possessing antioxidant potentials. Arsenic, a known human carcinogen and teratogen, is ubiquitously present in the environment, where it occurs as compounds of arsenite (As^{+3}) and (As^{5+}) [3], [4]. Arsenic contamination of drinking water is a serious environmental problem worldwide and the risk of developing arsenic-induced human disease from environmental exposure is particularly high in many developing countries [5]. A recent study of arsenic contamination of underground water in West Bengal, India has been reported [4]. Although the mechanism by which arsenic induces toxicity is not completely understood, free radicals have been implicated [6], [7]. Buccholzia coriacea (Capparidaceae) is a shrub or medium-sized tree, evergreen, with a dense crown, large glossary leathery leaves arranged spirally and clustered at the ends of the branches, and conspicuous cream-white flowers in racemes at the end of the branches. The bark of the plant Buchholzia coriacea is smooth, blackish-brown or dark-green. Slashes are deep red turning dark-brown [8], [9]. The fruits of the plant can be described large, long-stalked, ellipsoid, resembling avocardo pears, 12 x5-8 cm, endocarp up to 1.3 cm thick and woody, yellowish when ripe, flesh yellow edible, containing a few large blackish seeds, about 2.5 cm long [10], [11]. Different diseases are remedied with the seeds of the plant such as cough, chest pain, waist pain, irregular menstruation, internal piles, malaria, quick ejaculation, headache, hypertension, dysentery, premature ageing, etc [12], [13], [14]. The seed also acts as blood purifier, facilitates learning ability, migraine headache suppressor and strengthens the nervous system [13].

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2.0 MATERIALS AND METHODS.

Randox kits for AST, ALT, ALP, and LDH obtained from Randox Laboratories Limited,United Kingdom [15]. Sodium hydroxide, Mono and dibasic potassium phosphate were purchased from Merck (Germany).

2.1 SAMPLE COLLECTION AND PREPARATION OF THE EXTRACTS.

Buccholzia coriacea (seeds) were purchased from Oje market in Ibadan, Oyo State, Nigeria. Authentication was done at the Department of Plant Science and Biotechnology, Adekunle Ajasin University, Akungba Akoko, Ondo State, Nigeria. Voucher specimens were deposited in the herbarium. The air dried samples (1000g) each, ground to fine mesh, soaked in ethanol and water separately for 72h and filtered. The extracts were freeze-dried to remove ethanol and water. Appropriate quantity of each was soaked in distilled water before use.

2.2 ANIMALS.

Male albino rats weighing 70-120g, from Obafemi Awolowo University, breeding colony were kept in cages with access to food and water ad libitum, in a room with controlled temperature (25^{o}C) and in 12h light/dark cycle. The animals were maintained and used in accordance with the guidelines of the committee on Care and Use of Experimental Animal Resources, School of Science, Adekunle Ajasin University, Akungba Akoko, Ondo State,Nigeria.

2.3 TREATMENTS.

Animals were randomized into 10 groups of 5 rats each. Group 1 (control) received only distilled water, group 2 received a single dose of Na_2SO_3 (10 mg/kg, i.p.) dissolved in water on the sixth day only, groups 3-6 received 100, 200, 300 and 400mg/kg of water extract respectively for five days and were challenged with the Na_2SO_3 (10 mg/kg, i.p.) on the sixth day, groups 7-10 received 100, 200, 300 and 400 mg/kg of ethanolic extract respectively for five days and were challenged with the Na_2SO_3 (10 mg/kg, i.p.) on the sixth day. After the last administration, animals were anaesthetized and sacrificed 24h later. The blood was

collected by hearth puncture and serum was separated by centrifugation (3000 rpm at 4°C for 10 min).

2.3.1 TISSUE PREPARATION.

Livers were quickly removed, placed on ice and homogenized in 5 volumes of 0.68M phosphate buffer at pH 7.0. The homogenate were centrifuged at 4000 x g for 10min to yield a low speed supernatant fraction (SI) that was used for the assays. The supernatant were kept in the freezer at -4°C.

3.0 STATISTICAL ANALYSIS.

Data were analyzed by Duncan-test. Differences below the 0.05 level ($p < 0.05$) were considered as statistically significant.

4.0 RESULTS.

Table 1.

Effects of the water and ethanolic extracts of Buccholzia coriacea seeds (p.o. for 5 days) on sGOT in Sodium arsenite-induced hepatotoxicity in rats.

Treatment	Dose (mg/kg p.o.)	sGOT (U/l)*
Normal	-	5.33 ± 1.44^{a}
Control	-	25.67 ± 2.31^{d}
Water extract of B. coriacea	100	20.33 ± 2.31^{cd}
	200	15.00 ± 1.73^{bc}
	300	11.00 ± 1.73^{ab}
	400	6.17 ± 0.76^{a}
Ethanolic extract of B. coriacea	100	23.67 ± 4.16^{d}
	200	13.17 ± 7.65^{abc}
	300	12.33 ± 9.23^{ab}
	400	5.67 ± 1.26^{a}

**Values are means ± S.D (n = 5); values with same superscript are not significantly different at P < 0.05, using Duncan's test; Na2SO3 (10 mg/kg ,i.p.) was administered to all the groups except normal on day 6.*

Table 2.

Effects of the water and ethanolic extracts of Buccholzia coriacea seeds (p.o. for 5 days) on liver GOT in Sodium arsenite-induced hepatotoxicity in rats.

Treatment	Dose (mg/kg p.o.)	GOT (U/l)*
Normal	-	3.83 ± 3.55^{a}
Control	-	28.33 ± 2.31^{f}
Water extract of B. coriacea	100	17.17 ± 2.02^{e}
	200	14.00 ± 1.73^{de}
	300	11.00 ± 1.73^{bcd}
	400	9.00 ± 1.73^{abcd}
Ethanolic extract of B. coriacea	100	13.00 ± 5.20^{cde}
	200	11.33 ± 1.53^{bcd}
	300	8.00 ± 1.73^{abc}
	400	7.33 ± 4.91^{ab}

**Values are means ± S.D (n = 5); values with same superscript are not significantly different at P < 0.05, using Duncan's test; Na2SO3 (10 mg/kg ,i.p.) was administered to all the groups except normal on day 6.*

Table 3.

Effects of the water and ethanolic extracts of Buccholzia coriacea seeds (p.o. for 5 days) on sGPT in Sodium arsenite-induced hepatotoxicity in rats.

Treatment	Dose (mg/kg p.o.)	GPT (U/l)*
Normal	-	2.50 ± 0.87^{ab}
Control	-	7.17 ± 1.16^{e}
Water extract of B. coriacea	100	5.50 ± 0.87^{d}
	200	4.50 ± 0.87^{cd}
	300	4.17 ± 0.76^{bcd}
	400	2.67 ± 0.76^{ab}
Ethanolic extract of B. coriacea	100	5.33 ± 1.04^{d}
	200	3.20 ± 1.47^{abc}
	300	2.33 ± 0.67^{a}
	400	2.03 ± 0.75^{a}

**Values are means ± S.D (n = 5); values with same superscript are not significantly different at P < 0.05, using Duncan's test; Na2SO3 (10 mg/kg ,i.p.) was administered to all the groups except normal on day 6.*

Table 4.

Effects of the water and ethanolic extracts of Buccholzia coriacea seeds (p.o. for 5 days) on liver GPT in Sodium arsenite-induced hepatotoxicity in rats.

Treatment	*Dose (mg/kg p.o.)*	*GPT (U/l)**
Normal	-	*3.00 ± 1.45^{a}*
Control	-	*23.00 ± 2.29^{e}*
Water extract of B. coriacea	*100*	*13.83 ± 1.44^{d}*
	200	*10.33 ± 1.76^{cd}*
	300	*9.33 ± 1.04^{c}*
	400	*7.50 ± 0.87^{bc}*
Ethanolic extract of B. coriacea	*100*	*6.97 ± 4.32^{abc}*
	200	*4.47 ± 1.85^{ab}*
	300	*3.97 ± 0.92^{ab}*
	400	*3.23 ± 2.83^{a}*

**Values are means ± S.D (n = 5); values with same superscript are not significantly different at P < 0.05, using Duncan's test; Na2SO3 (10 mg/kg ,i.p.) was administered to all the groups except normal on day 6.*

Table 5.

Effects of the water and ethanolic extracts of Buccholzia coriacea seeds (p.o. for 5 days) on sALP in Sodium arsenite-induced hepatotoxicity in rats.

Treatment	Dose (mg/kg p.o.)	ALP (U/l)*
Normal	-	27.83 ± 5.30^{e}
Control	-	60.77 ± 1.97^{f}
Water extract of B. coriacea	100	28.00 ± 4.44^{c}
	200	18.33 ± 4.07^{ab}
	300	23.33 ± 4.91^{bc}
	400	23.00 ± 4.36^{bc}
Ethanolic extract of B. coriacea	100	46.00 ± 2.00^{e}
	200	36.33 ± 6.03^{d}
	300	27.50 ± 2.65^{c}
	400	15.67 ± 1.26^{a}

**Values are means ± S.D (n = 5); values with same superscript are not significantly different at P < 0.05, using Duncan's test; Na2SO3 (10 mg/kg ,i.p.) was administered to all the groups except normal on day 6.*

Table 6.
Effects of the water and ethanolic extracts of Buccholzia coriacea seeds (p.o. for 5 days) on sLDH in Sodium arsenite-induced hepatotoxicity in rats.

Treatment	Dose (mg/kg p.o.)	sLDH (U/l)*
Normal	-	53.33 ± 1.53^{b}
Control	-	107.17 ± 6.21^{d}
Water extract of B. coriacea	100	67.33 ± 7.02^{c}
	200	53.67 ± 4.51^{b}
	300	26.83 ± 1.61^{a}
	400	53.83 ± 3.25^{b}
Ethanolic extract of B. coriacea	100	53.00 ± 2.18^{b}
	200	67.33 ± 2.08^{c}
	300	67.00 ± 1.50^{c}
	400	27.00 ± 0.50^{a}

**Values are means ± S.D (n = 5); values with same superscript are not significantly different at P < 0.05, using Duncan's test; Na2SO3 (10 mg/kg ,i.p.) was administered to all the groups except normal on day 6.*

5.0 DISCUSSION.

Phenolic compounds, which are widely distributed in plants, were considered to play an important role as dietary antioxidant for prevention oxidative stress or damage in living systems [16], [17]. In this study, the total phenolic content of water extract was 25.5 mg/g of GAE while that of ethanolic extract was 18.0 mg/g of GAE. The leakage of marker enzymes is a general index of hepatic cytotoxicity [18]. The increase in transaminase / transferase in the serum may said to be due to the destruction of the endothelium of hepatic venules [19]. The rise in serum levels of LDH, ALT, AST and ALP has been attributed to the damaged structural integrity of the liver, because these are normally located in the cytoplasm and are released into the circulation after cellular damage [20]. A single dose of Na_2AsO_3 (10mg/kg) caused hepatotoxicity in rats. A remarkable elevation was observed in hepatic enzymes, such as AST, ALT, LDH and ALP following administration of Na_2AsO_3 in the rats. In the groups orally pretreated with 100, 200, 300 and 400mg/kg of the extracts, the above enzymes were found to decrease ($p>0.05$) when compared to Na_2AsO_3 treated control group (Tables 1, 2, 3, 4, 5 and 6). The decrease in the levels of the enzymes were found to be dose dependent. Doses of 300 and 400mg/kg almost completely prevented hepatotoxicity caused by Na_2AsO_3. In summary, the present study demonstrates that B.Coriacea has dose dependent protective effect against Na_2AsO_3 induced hepatotoxicity, and I believe it is likely that this protective effect is probably mediated by the pytochemicals present in B. Coriacea.

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