The effect of aqueous leaves extract of henna (*Lawsonia inermis*) in carbon tetrachloride induced hepato-toxicity in swiss albino mice

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ABSTRACT: The hepato-protective effect of aqueous leave extract of *Lawsonia inermis* on Carbon tetrachloride induced liver damage in swiss albino mice was investigated by measuring the serum of Alanine aminotransferase (ALAT) and Aspartate aminotransferase (ASAT). Groups A and F were administered carbon tetrachloride and distilled water respectively. Groups B and C were administered the extract at 100mg/kg and 150mg/kg body weight respectively for seven days prior to carbon tetrachloride treatment, while groups D and E were administered extract alone at 100mg/kg and 150 mg/kg body weight respectively. The extract significantly ($P \leq 0.05$) decreased the serum levels of ASAT and ALAT, even though not dose dependant. The results suggest that aqueous leave extracts of *Lawsonia inermis* has hepato-protective effects at appropriate dosage. [Academia Arena, 2010;2(6):87-89] (ISSN 1553-992X).

KEYWORDS: Hepato-protective, *Lawsonia inermis*, Carbon tetrachloride, Alanine aminotransferase (ALAT), Aspartate aminotransferase (ASAT).

INTRODUCTION

Many higher plants produce important organic compounds such as resins, tannins, flavonoids, pesticides and other pharmacological compounds; however, most of the plants have not been scientifically evaluated for their toxicity, efficiency and constitute as well. Henna (Lawsonia inermis) is extensively grown in the Middle East and Africa . It has an astringent taste and tea like odor. When the dried leaves are soaked in water and applied to the skin, hair or nails, auburn to red color develops, hence it is worldwide recognized as cosmetic agent used for ornamental values.

Carbon tetrachloride also known as tetra chloromethane is known to have hepatotoxic effects. Carbon tetrachloride is a synthetic chemical compound formally widely used in fire extinguishers but largely abandoned now due to its toxicity. At room temperature and pressure it is a colorless liquid with a "sweet" smell that can be detected at low levels. Exposure to higher concerntration of this compound can affect the central nervous system including the brain. When exposed, the liver is inflamed and hepatocytes will be destroyed (5). The objective of this study therefore is to evaluate the hepato-protective effect of L. inermis in carbon tetrachloride induced liver damage.

MATERIALS AND METHODS

PLANT COLLECTION

Fresh leaves of Lawsonia inermis were obtained from Gashua town of Barde Local Government Area of Yobe state Nigeria. The plant was identified by a toxonomist in the department of Biological Sciences, University of Maiduguri, Nigeria.

EXPERIMENTAL ANIMALS

Thirty Swiss Albino mice weighing between 20-40g were used. They were kept in plastic cages in the laboratory for one week before the commencement of the experiment to acclimatize. They were fed commercial chick mash (Vital feeds Nig. Ltd) and given water ad libitum.

PREPARATION OF PLANT AQUEOUS EXTRACT

The leaves of Lawsonia inermis (Henna) were washed with distilled water. The leaves were sun dried

and grounded into powder using pestle and mortar. Fifty (50) grams of the powdered leaves were mixed with five hundred Milles (500 ml) of water in a flat bottom flask and boiled for 30 minutes. It was allowed to cool and then filtered using a Whatman no.1 filter paper size 0.1µm (micrometer). The filterate was stored at 4oC. The plant aqueous extract was prepared according to the method of Mittal and Aguwa, (3).

EXTRACT ADMINISTRATION

The mice were divided into six (6) groups of five mice each.

Group A mice were administrated Carbon tetrachloride at a dose rate of 4mg/kg body weight subcutaneously.

Group B mice were administered the extract at dose rate of 100mg/kg body weight orally daily for seven consecutive days, and 24 hours after the last dose of extract. Carbon tetrachloride was administered subcutaneously at dose rate of 4mg/kg.

Group C mice were administered the extract at dose rate of 150mg/kg body weight orally daily for seven consecutive days, and 24 hours after the last dose of extract. Carbon tetrachloride was administered subcutaneously at the dose rate of 4mg/kg.

Group D mice were administered the extract alone at dose rate of 100mg/kg body weight orally daily for seven consecutive days.

Group E mice were administered the extract alone at dose rate of 150mg/kg body weight orally daily for seven consecutive days.

COLLECTION OF BLOOD AND LIVER SAMPLES

All the mice from each group were sacrificed 24 hours after administration of carbon tetrachloride and the blood collected in a plane sample bottle via the jugular vein. The blood was allowed to clot and centrifuge at 1500rpm and the serum collected for determination of Alanine aminotransferase and Aspartate aminotransferase concentration.

DETERMINATION ALANINE AMINOTRANSFERASE (ALAT) AND ASPARTATE AMINOTRANSFERASE (ASAT)

The in vitro determination of Alanine aminotransferase and Aspartate aminotransferase was carried out by the method described by Reitman and Frankel, (6) and Schmidt and Schmidt, (19).

STATISTICAL ANALYSIS

The Graphpad Instat 3.0 computer software (2) was used to analyse the data generated. A significant level of $P \leq 0.05$ was considered.

RESULTS

The result of the experiment showing the effect of aqueous leaves extract of Henna (Lawsonia inermis) on carbon tetrachloride induced liver damage is presented in table 1.

All the mice administered the extract showed a significant ($P \leq 0.05$) decrease in both ALAT and ASAT level when compared with group treated with carbon tetrachloride (4mg/kg body weight) alone. However those treated with the extract alone showed higher decreased level of the enzymes then those administered the extract after CCl4 treatment.

The groups treated with 100mg/kg body weight and 150mg/kg body weight of the extract alone recorded significant decrease in the level of ALAT only when compared with the group given distilled water alone. However, the group treated with carbon tetrachloride (4 mg/kg body weight) alone and those treated with 100 mg/kg body weight and 150mg/kg body weight of the extract before carbon tetrachloride administration recorded a significant increase in both ALAT and ASAT level when compared with group treated with distilled water alone.

DISCUSSION AND CONCLUSSION

The result of the study showed that the aqueous leave extract of Lawsonia inermis administered at the dosage used for the experiment suppressed the activity of the liver enzymes in treated animals compared with the control and the group treated with carbon tetrachloride alone.

The extract was found to contain flavonoids, tannins, coumarin, mannitol (8). Flavonoids are reported to exhibit antioxidant activity (4) and are effective scavengers of superoxide anions (7). Beneficial effect of flavonoids has been described for successful treatment of many health conditions, including cancer and liver diseases. They can also bind to enzymes and DNA to chelate heavy metals . The extract may have exhibited hepato-protective activity due to its antioxidant property attributable to the flavonoids, since antioxidants are found to protect liver cells against damaging effects of the reactive oxygen species such as singlet oxygen, superoxide, peroxynitrite, peroxyl and hydroxyl radicals (1).

Antioxidants prevent the oxidative stress which comes up as a result of reactive oxygen that is known for their cellular damaging effect (1).

In conclusion, the aqueous extract of L. inermis has been observed to suppress the liver enzymes therefore has possible hepato-protective activity in the mice because of the presence of flavonoids.

TABLE 1. THE EFFECT OF AQUEOUS LEAVES EXTRACT OF HENNA (*LAWSONIA INERMIS*) ON LIVER ENZYMES OF SWISS ALBINO MICE TREATED WITH CARBON TETRACHLORIDE.

GROUP	LIVER ENZYMES	
	ALANINE AMINOTRANSFERASE (ALAT)	ASPARTATE AMINOTRANSFERASE (ALAT)
A (CCl_4 4mg/kg)	130.2 ± 6.87	217.8 ± 10.66
B (100mg/kg of extract and 4mg/kg of CCl_4)	101.8 ± 17.12*	185.4 ± 9.55*
C (150mg/kg of extract and 4mg/kg of CCl_4)	106.8 ± 10.28*	187.0 ± 9.72*
D (100mg/kg of extract alone)	18.8 ± 3.49 * [a]	90.8 ± 9.91*
E (150mg/kg of extract alone)	13.4 ± 2.97* [a]	65.2 ± 5.63*
F (distilled water)	22.2 ± 3.11 [a]	113.5 ± 11.12

[a] Significant ($P \leq 0.05$) decrease compared with distilled water

* Significant ($P \leq 0.05$) decrease compared with carbon tetrachloride

REFERENCES

1. Donald R. B., Cristobal M., (2000): Antioxidation activities of flavonoids. Linus Pauling Institute, Oregon State Univ., Dept. of Environment and Molecular Toxicology.
2. Graphpad Instat (2004), Graphpad Instat 3.00 for windows 95, Graphpad software, San Diego, California, USA. Copyright 1992-1998 Graphpad software Inc.
3. Mittal G. C. and Aguwa C. N. (1983): Abortifacient effects of the root of Mormodica angustice pala. Journal of Ethnopharm. 7:169-73.
4. Ramanathan R., Lau K. K., Das N. P., (1989): Antiperoxidative action of flavonoids and related products, ground pork. (Abstract). Proceedings of III Int. Symp. On Flavonoids in biological and medicine in Singapore. Pp 56.
5. Recknagel R. O., Elende E. A., Dolak J. A., Waller R. L., (1989): Mechanism of carbon tetrachloride toxicity. *Pharmacological Therapeutics* (43) 139-54.
6. Reitman S. and Frankel A.S., (1959): A colometric method of determination of serum glutamic oxaloacetic and glutamic pyruvic transaminases. *Am. J. Clinical pathology*. 28:53-63.
7. Robak and Gryglewski R. J. (1988): Flavonoids are scavengers of superoxide anions. *Biochem. Pharmacol*. 37: 837-41.
8. Safepharm Laboratories Limited (1992): project number 436-4, Henna Rot Micronucleus test in mouse.
9. Schmidt E and Schmidt F.W.. (1963): Enzyme Biology Clinicals 3:1.

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