International Journal of Animal and Veterinary Advances 3(1): 10-13, 2011
ISSN: 2041-2908

Received: September 17, 2010 Accepted: December 08, 2010 Published: February 05, 2011

Hepatoprotective Effect of Ethanolic Leave Extract of *Moringa oleifera* on the Histology of Paracetamol Induced Liver Damage in Wistar Rats

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Abstract: This study was designed to evaluate the Hepatoprotective effect of Ethanolic leave Extract of Moringo Oleifera on the Histology of the liver of wistar rats. Fifteen (15) female adult wistar rats were divided into three (3) groups. Group I was the Control group that received distilled water only, group II was the negative control that received 1 g/kg of paracetamol on the 10th day, and group III received 500 mg/kg of the extract for duration of ten (10) days. Group III was pre-treated with 500 mg/kg of the ethanolic leave extract of *Moringa oleifera* before inducing the liver damage on the 10th day with 1 g/kg of paracetamol. Twelve (12) h after administration, the rats were sacrificed and the liver was fixed immediately in Formalin. The liver tissues was processed and stained in Haematoxylin and Eosin (H&E).The histological observations showed that the leave extract of *Moringa oleifera* was hepatoprotective.

Key words: Hepatoprotective, liver damage, *Moringa oleifera*, paracetamol, wistar rats

INTRODUCTION

Liver is an organ in the upper abdomen that aids in digestion and removes waste products and worn-out cells from the blood. It is a vital organ present in vertebrate and some other animals, which has a wide range of functions including detoxification and protein synthesis. The liver is our greatest chemical factory, it builds complex molecules from simple substances absorbed from the digestive tract, it neutralises toxins, it manufactures bile which aids fat digestion and removes toxins through the bowels (Maton *et al*., 1993). But the ability of the liver to perform these functions is often compromised by numerous substances we are exposed to on a daily basis; these substances include certain medicinal agents which when taken in over doses and sometimes when introduced within therapeutic ranges injures the organ (Gagliano *et al*., 2007).

Liver disease is worldwide problem. Conventional, drugs used in the treatment of liver diseases are sometimes inadequate and can have serious adverse effects. Therefore, it is necessary to search for alternative drugs for the treatment of liver disease in order to replace currently used drugs of doubtful efficacy and safety (Ozbek *et al*., 2004). In the absence of reliable liver-protective drugs in allopathic medical practices, herbs play a role in the management of various liver disorders. However, we do not have satisfactory remedy for serious liver disease; most of the herbal drugs speed up the natural healing process of liver, so the search for effective hepatoprotective drug continues.

Moringa oleifera is the most widely cultivated species of a monogeric family, the Moringaceae that is native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. *Moringa oleifera* or the horseradish tree is a pan-tropical species that is known by such regional names as benzolive, drumstick tree, kelor, marango, mlonge, nebeday, Sajhan and Sajna.

The tree has its origin from the South Indian of Tamil Nadu, kerala, from where the name *Moringa* came. It is believed to have variety usages which include combating malnutrition, anticancer and is being promoted as a panacea (Fahey, 2005; Fuglie, 1999, 2000; Galan *et al*., 2004; Ruckmani *et al*., 1998). In many cases, published *in-vitro* (cultured cells) and *in-vivo* (animal) trials do provide a degree of mechanistic support for some of the claims that have sprung from the traditional medicine lore. For example, numerous studies now point to the elevation of a variety of detoxication and antioxidant enzymes and biomarkers as a result of treatment with *Moringa* or with phytochemicals isolated from *Moringa* (Fahey *et al*., 2004; Faizi *et al*., 1994; Gupta and Mazumdar, 1999; Kumar and Paris, 2003; Mazumder *et al*., 1999; Rao *et al*., 1999.) This study was designed to investigate the hepetoprotective effect of the ethanolic leave extract of *Moringa oleifera* on the Histology of paracetamol induced liver damage.

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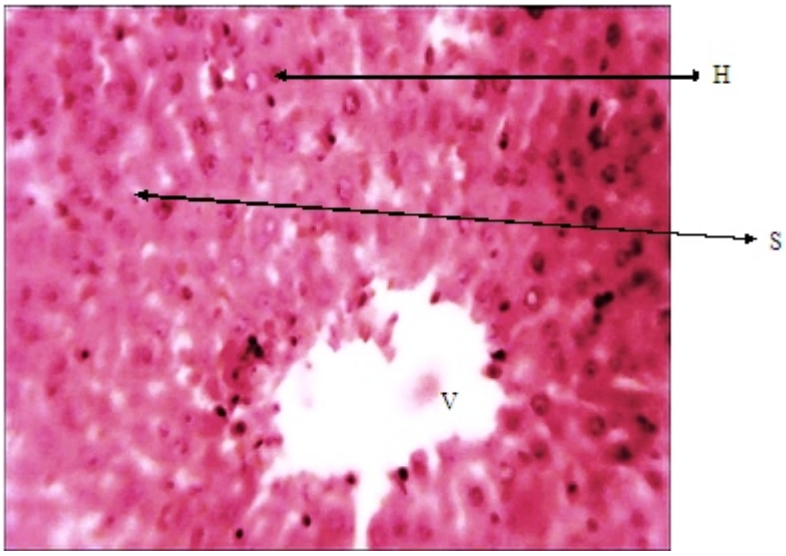

Fig. 1: Histology of the normal liver (control group I) showing the central vein (V), hepatocytes (H), and sinusoid (S) at Mag. X. 400

MATERIALS AND METHODS

This experiment was carried out in the Department of Human Anatomy, Faculty of Medicine, Ahmadu Bello University, Zaria, Kaduna, Nigeria in the year 2009.

Plant materials: The leaves of *Moringa oleifera* was procured from areas of Ungwar Rimi (in Kaduna) and authenticated at the department of Biological sciences, Herbarium, Ahmadu Bello University, Zaria.

Preparation of extract: Fresh leaves of *Moringa oleifera* were collected, shade-dried and pounded into powder before extraction. The powder was macerated into absolute alcohol at room temperature. The filtrate was concentrated under reduced pressure and later evaporated in a water bath using evaporating dish at 45°C. A greenish paste was obtained. The extraction of *Moringa oleifera* leaves was done in the department of Pharmacognosy, Ahmadu Bello University, Zaria.

Experimental animals: Fifteen (15) female adult Wistar rats weighing 150 to 210 g were obtained from the faculty of Pharmaceutical sciences, Ahmadu Bello University, Zaria for the study. The animals were fed with standard diet and water and were adapted to the laboratory environment in the Department of Human Anatomy for two weeks in order to acclimatize. The duration of administration was Ten (10) days.

Experimental design: Modification of the plan of Tella and Ojo (2005) were used. Fifteen (15) Adult female Wistar rats weighing between150 and 210 g were grouped into three (3) as follow:

- Group I was the control group. They were administered distilled water only (Fig. 1).
- Group II was the Negative control group and were administered distilled water with 1 g/kg (hepatotoxic dose) body weight of paracetamol on the 10th day of the experiment (Fig. 2).
- Group III was administered 500 mg/kg body weight of the ethanolic extract of *Moringa oleifera* leaves on a daily basis for 10 days and they received 1 g/kg (hepatotoxic dose) body weight of paracetamol on the 10th day of the experiment (Fig. 3).

Oral route of administration was used and the administration lasted for 10 days.

On the 10th day of the experiment, Wistar rats in groups II, and III were given 1 g/kg body weight of paracetamol.

Tissue processing and staining: The rats were sacrificed 12 h after administration of paracetamol by anesthetizing them in a suffocating chamber using chloroform, they were then dissected and the liver tissues were removed, and immediately fixed in 10% formalin. The tissues were transferred into an automatic processor where they went through a process of dehydration in ascending grades of alcohol (ethanol) 70, 80, 95% and absolute alcohol for 2 changes each. The tissues were then cleared in Xylene and embedded in paraffin wax. Serial sections of 5 micron thick were obtained using a rotary microtome. The tissue

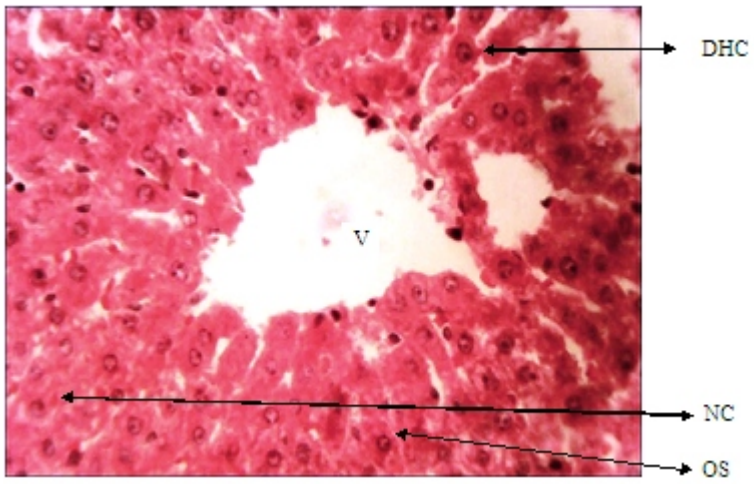

Fig. 2: Histology of liver of the Negative control group with 1 g/kg of paracetamol (group II) showing distorted hepatic cords (DHC),necrotic cells (NC) and obliterated sinusoids (OS) at Mag. X. 400

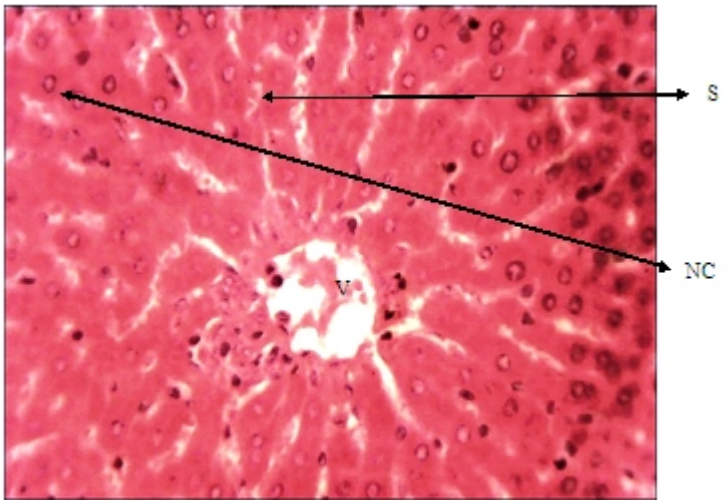

Fig. 3: Histology of the liver treated with 500 mg/kg of extract (group III) showing fewer necrotic cells (NC) and wider sinusoidal spaces at Mag. X. 400

sections were deparaffinised hydrated and stained using the routine haematoxylin and eosin staining method (H&E). The stained sections were examined under the light microscope.

RESULTS AND DISCUSSION

Liver is an organ involved in many metabolic functions and is prone to xenobiotic injury because of its central role in xenobiotic metabolism (Sturgill and Lambert, 1997). Hepatotoxic drugs cause damage to the liver (Kumar *et al*., 2004; Sturgill and Lambert, 1997).

The results of the present study showed that the ethanolic extract of *Moringa oleifera* leaves have some degree of hepatoprotective ability as seen in Fig. 3, where there was fewer necrotic cells and wider sinusoidal spaces when compared with the negative control group (Fig. 2) that showed marked distorted hepatic cords, necrotic cells and obliterated sinusoids. Paracetamol was used in this study to induce the liver damage (Fig. 2) and it was reported to be hepatotoxic (Wallace, 2004; Moore *et al*., 1985). Based on the results obtained, we therefore inferred that *Moringa oleifera* leave extract has some protective effect on the liver as shown by the reduced damage in group III (Fig. 3).

The reduced necrosis of cells in the group III study might be due in part to the presence of chemical constituents which have hepatoprotective properties. Liver protective herbal drugs contain a variety of chemical constituents like phenols, coumarins, lignans, essential

oil, monoterpenes, carotinoids, glycosides, flavonoids, organic acids, lipids, alkaloids and xanthenes (Gupta and Misra, 2006), this may be present in the *Moringa oleifera* and so responsible for this effect. From this study, we therefore inferred that ethanolic leave extract of *Moringa oleifera* has an appreciable ability to prevent damage to the liver.

ACKNOWLEDGEMENT

The authors wish to acknowledge the management of Ahmadu Bello University, Zaria for providing a conducive environment and support for this Research work.

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