



## Histopathological changes caused by accidental avocado leaves toxicity in rabbits

W. Ramdas Singh<sup>1</sup>, Tridib K. Rajkhowa<sup>2</sup>, KH. Victoria Chanu<sup>3</sup>, M. Ayub Ali<sup>3</sup>, C. Lalmuanthanga<sup>1</sup>, Pritam Mohan<sup>1</sup>  
M. A. Ayub Shah<sup>1\*</sup>

<sup>1</sup>Department of Pharmacology and Toxicology, College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram-796014, India

<sup>2</sup>Department of Veterinary Pathology, College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram-796014, India

<sup>3</sup>Department of Veterinary Physiology & Biochemistry, College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram-796014, India

### ABSTRACT

Avocado is one of the common fruits in the state of Mizoram, India. Though the fruit is loaded with various nutrients, leaves are highly toxic to rabbits. Dead male Chinchilla rabbits (2 months old) died due to ingestion of avocado leaves was the subject of the present study. On post-mortem examination, pathological changes like severe congestion and petechiation of liver, infarction of kidney and congestion of myocardium were observed. Histopathological changes include hepatic degeneration with severe congestion, degeneration of kidney tubular epithelial cells with congestion in the interstitium and degeneration and fragmentation of myocardial cells.

**Keywords:** *Persea americana*; leaves poisoning; rabbits; histopathological changes

### INTRODUCTION

Rabbits are vegetarians but it doesn't mean they can consume all vegetation. There are some food items that are safe for other animals including humans but cause ill effect on the sensitive digestive system of rabbits. Avocado leaves should be kept away from rabbits. Avocado (*Persea americana*) is a common exotic fruit native to Mexico and central America. They are grown in southern areas of North America and throughout tropical areas of the world for their edible fruits. The fruit is reported to be loaded with nutrients and an excellent source of monounsaturated fat. Researchers have shown that avocados extracts improved calcium absorption in rats and addition of avocado to salsa significantly improved lycopene, lutein and carotenes absorption in healthy human subjects (Raonimala *et al.*, 1980; Unlu *et al.*, 2005). Lopez *et al.*, 1996 have observed that after a seven-day diet rich in avocados, hypercholesterolemia patients showed a 17%, 22% and 22% decrease in total serum cholesterol levels, LDL and triglycerides respectively with 11% increase in HDL. However leaves are toxic to rabbits although the toxicity varies with the variety (Craigmill *et al.*, 1984).

Avocado toxicity was reported as early as 1942 in California (Appleman, 1944) and since then a variety of species including cattle, horses, goats, rabbits, canaries, budgerigars, cockatiels, ostriches and fish have been poisoned by eating leaves and fruits of the avocado tree (Kingsbury, 1964; Hargis *et al.*, 1989; Burger *et al.*, 1994; McKenzie and Brown, 1991; Hurt 1943; Craigmill *et al.*, 1989). The leaves, bark, seeds and skin of the fruit are toxic and leaves remain toxic after dried. It has also been suggested that leaves should not be allowed to fall accidentally into fish tanks (Hurt 1943; Fuller and Mc Clintock, 1986). In mammals that have been experimentally fed dried leaves suffered cell death of the mammary glands which are commonly observed clinical finding in livestock, including goats and cattle, known to have ingested avocado plant parts (Clipsham, 2007).

Cattle, horses, goats and rabbits develop non infectious mastitis after eating avocado leaves (Craigmill *et al.*, 1989; Sani *et al.*, 1994). Oelrichs *et al.* (1995) have reported that avocado leaves contain a toxic fatty acid derivative known as persin which in sufficient quantity can cause equine colic and without veterinary treatment, death. The symptoms include gastrointestinal irritation, vomiting, diarrhea, respiratory distress, congestion, fluid accumulation around the tissues of the heart and even death. According to McKenzie and Brown (1991), avocado poisoning in horses lead to development of edematous swelling of the lips, mouth, eyelids, head and neck, which can cause upper respiratory distress. Brisket and neck edema, and acute pul-

\* Corresponding Author

Email: drmaasvptcau@yahoo.co.in

Contact: +91-9436151974

Received on: 26-08-2010

Revised on: 26-09-2010

Accepted on: 28-09-2010

monary edema as a result of cardiomyopathy and heart failure, have also been reported in rabbits and goats that have died from avocado poisoning (Craigmill *et al.*, 1989).

Since there is limited published research on the subject of avocado poisoning, this study has been undertaken to check the histopathological changes in accidental avocado leaves poisoning rabbits.

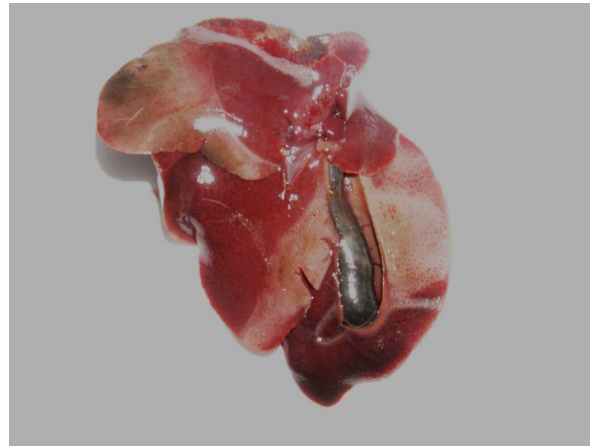
#### MATERIALS AND METHODS

Eleven two months old male Chinchilla rabbits out of twenty in the Laboratory Animal House of College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, Selesih, Mizoram, India were found dead in the next morning after ingestion of avocado leaves the night before. The remaining 9 (nine) rabbits were showing the signs of weakness, anorexia, depression, dullness and dyspnea. All the rabbits were huddling at one corner of the cage. Blood was collected from one of the rabbits. Later four more rabbits became comatose after showing the signs and finally died. Post mortem examination of the dead rabbits was done to find out the cause of the death. Kidney, liver and heart were collected in 10% formalin for histopathological studies and processed for microscopic examinations (Luna, 1968) and digital microphotographs prepared.

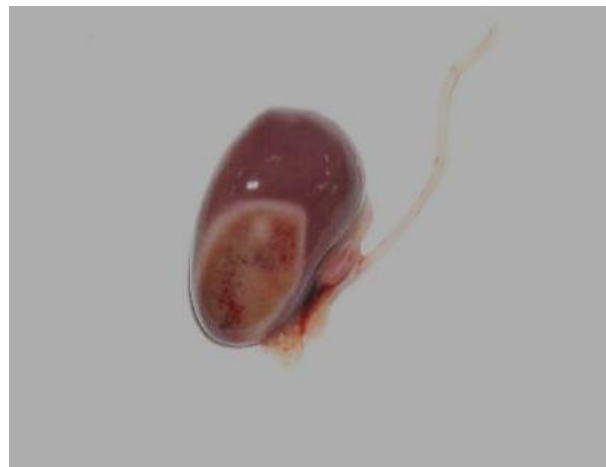
#### RESULTS

Post mortem examination of the dead rabbits revealed severe congestion and edema of liver, spleen, kidney, stomach and myocardium. Liver was soft, icteric (yellowish in color) with areas of severe congestion and patecheation (Fig.1). The kidney of 4 rabbits showed an area of infarction with patecheation (Fig. 2). In all the dead rabbits the mucosal surface of stomach was covered with thick fibrino-catarrrhal exudates. Beneath this the mucosa was severely congested, edematous and haemorrhagic. The mucosa of the stomach sloughed off easily.

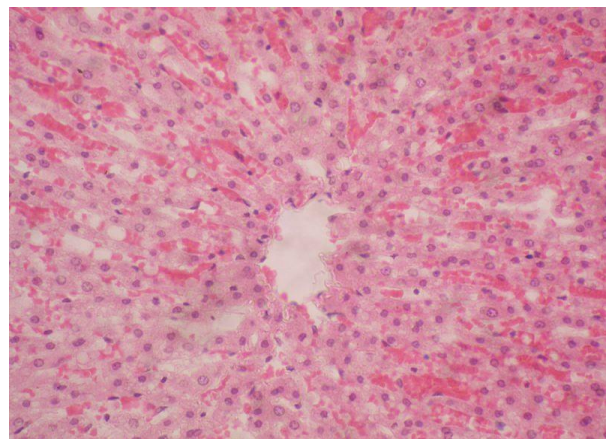
Histopathological examination revealed hepatic degeneration throughout the hepatic parenchyma with severe congestion (Fig. 3). Hepatic cells were swollen with vacuolation and ruptured at many places. Sinusoidal spaces were dilated and packed with RBCs. Bile ducts revealed mild hyperplasia of mucosal epithelium. Microscopically, kidneys revealed swelling and degeneration of tubular epithelial cells with congestion in the interstitium. Degeneration and fragmentation of the myocardial cells and hemorrhages were observed in the myocardium (Fig. 4). Gastric mucosa showed severe congestion, hemorrhages, edema and sloughing off of degenerated mucosal epithelium.



**Figure 1: Icteric soft liver with areas of severe congestion and patecheation**



**Figure 2: Kidney showing area of infarction with patecheation**

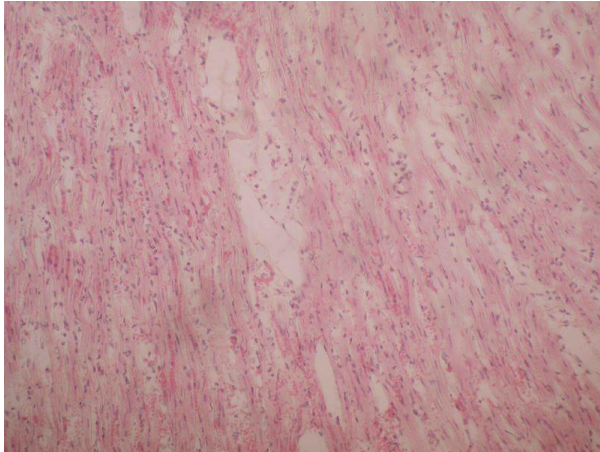


**Figure 3: Liver showing vacuolar degeneration and rupture of hepatocytes with severe congestion (H&E, 400X)**

#### DISCUSSION

Avocado poisoning has been a source of controversy since the fruits are reported to be loaded with nutrients but there has been documented evidences that animals such as cats, dogs, cattle, goats, rabbits, rats,

birds, fish, and horses can be severely harmed or even killed when they consume the avocado leaves, bark, skin or pit (Oelrichs *et al.*, 1995 and Clipsham, 2007).



**Figure 4: Degeneration and fragmentation of myocardial cells with congestion (H & E, 400X)**

The degeneration and fragmentation of the myocardial cells and hemorrhages observed in the myocardium were in agreement with the findings of Oelrichs *et al.* (1995) who have reported that persin, the toxic fatty acid present in avocado leaves can cause hydrothorax and necrosis of myocardial fibers at a dose rate above 100mg/kg animal body weight. Hargis *et al.* (1989) and Burger *et al.* (1994) have also reported typical generalized congestion of the lungs, hydropericardium and subcutaneous oedema in the pectoral area at post mortem examination. Researchers have also observed the non-inflammatory necrosis of the myocardium and lactating mammary gland in avocado leaves fed goats and mice (Sani *et al.*, 1991; Sani *et al.*, 1994; Grant *et al.*, 1991). Histopathological changes observed in the present study were hepatic degeneration throughout the liver parenchyma with severe congestion. Other observations include swollen hepatic cells with vacuolation and dilated sinusoidal spaces packed with RBCs, swollen kidneys with degenerated tubular epithelial cells and congestion in the interstitium. These observations are comparable to the findings of other workers (Craigmill *et al.*, 1989; Sani *et al.*, 1991; Sani *et al.*, 1994; Grant *et al.*, 1991) who have reported scattered non suppurative inflammation in the liver, heart, and kidneys and eosinophilic material in the cytoplasm of many Kupffer cells. The histopathological changes observed were consistent with the biochemical and gross pathological changes reported earlier (Ali *et al.* 2010).

From these observations, it may be concluded that avocado leaves are very toxic to rabbits as it produced severe degenerative cellular changes in vital organs such as liver, kidneys and heart causing high mortality. Therefore, rabbits should not be fed with avocado leaves. Further, it should also be borne in mind that the avocado plant must be planted away from livestock

enclosures to avoid accidental poisoning in other species of animals.

#### **Acknowledgements:**

The authors are grateful to the Dean, College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, Aizawl, India for providing necessary facilities to carry out the present work.

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