TOXICITY OF FRESH JUICE OF *MIMOSA INVISA* IN RABBITS*

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Abstract

An experiment was conducted to study the toxic dose of Mimosa invisa in rabbits. Six adult rabbits were administered with fresh juice of M. invisa @ 15,20,25 & 30g/kg orally. It was revealed that a dose of 25g/kg of M. invisa was toxic to rabbits and that a dose of 30g/kg produced acute toxicity resulting in death of rabbits. There was also an increase in the levels of serum creatinine and urea with damages to the liver, kidney and heart.

Key words: *Mimosa invisa, toxic dose, rabbits.*

Mimosa invisa is a shrubby herbaceous annual plant. It is a native of tropical America and it was imported by neighbouring tea garden from East Asia in1960s as a nitrogen fixer prior to planting tea. *Mimosa invisa* toxicity is common in Kerala during rainy season when there is luxurious growth of this plant. Poisoning is reported frequently in cattle and goats. The phytotoxin present in the plant affect mainly kidneys (Rajan *et al.*, 1986). The main clinical symptoms reported were reduced feed and water intake (Alex *et al.*, 1991). As a detailed toxicity study of this plant is lacking a study was undertaken to assess the toxicity of fresh juice of *M. invisa* in rabbits.

Materials and Methods

A pilot study was conducted to derive the toxic dose of *Mimosa invisa* fresh juice. Eight adult rabbits were divided into four groups of two animals each. Four dose levels of *M. invisa* (15, 20, 25, 30 g/kg) as fresh juice was administered to these rabbits for 20 days. Levels of Urea, Creatinine, ALT and AST were taken as toxicity criteria. Toxic dose derived from the pilot study was used for detailed toxicological investigation.

Twelve adult rabbits were divided into two groups of six animals each. Group I was maintained with the control diet alone. Fresh juice obtained from toxic dose of *M. invisa* was administered to Group II for 20 days. Blood was collected from these animals before the administration of juice and also on the 1st, 3rd, 5th, 10th, 15th and 20th day after administration. Serum was separated and analysed for ALT, AST, GGT, CK, ALP, Creatinine and Urea. The data were analysed statistically by t-test (Snedecor and Cochran, 1985).

Results and Discussion

The pilot study showed that the animals administered with *M. invisa* fresh juice equivalent to 15-20 g/kg did not show any change in biochemical parameters. The animals were active and taking feed and water normally throughout the experiment. But the dose rate of 25 g/kg of *M. invisa* showed anorexia, dullness and lethargy. There was significant increase in ALT, AST, creatinine and urea on the first and third day of the experiment. Thereafter the values gradually decreased and returned to normal by 20th day of the experiment. The group administered with fresh juice obtained from 30 g/kg of *M. invisa,* killed

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Table. Effect of toxic dose of *Mimosa invisa* on serum biochemistry in rabbits

Parameters	Groups	Days after administration of *M. invisa* juice						
		0	1	3	5	10	15	20
ALT (U/L)	I	38.17 ± 2.54	40 ± 0.97	39.17 ± 1.07	40.33 ± 1.2	36.83 ± 2.48	38 ± 1.41	35.33 ± 1.76
	II	40.67 ± 4.45	212.5 ± 33.26**	165.67 ± 15.63**	143.5 ± 11.31**	116.33 ± 9.93**	55.17 ± 5.65*	50.33 ± 1.74*
AST (U/L)	I	33.83 ± 2.8	35.5 ± 1.73	31.17 ± 1.14	37 ± 1.26	33.17 ± 2.3	33.83 ± 1.4	33.0 ± 1.39
	II	35.5 ± 4.18	91.67 ± 18.73*	141.5 ± 14.11**	111.83 ± 8.27**	56.33 ± 10.93*	50.5 ± 7.28*	46.67 ± 4.65*
GGT (U/L)	I	5.5 ± 0.43	5.17 ± 0.31	5.5 ± 0.56	4.83 ± 0.30	5.17 ± 0.40	5.17 ± 0.48	5.67 ± 0.33
	II	4.67 ± 0.33	8.5 ± 0.43**	10.67 ± 0.49**	8.00 ± 0.58**	7 ± 0.37**	5.17 ± 0.40	4.5 ± 0.22
CK (U/L)	I	183.17 ± 13.48	184.33 ± 11.94	180.67 ± 12.54	180.67 ± 12.05	184.5 ± 13.48	182.5 ± 13.23	187.33 ± 12.65
	II	178 ± 16.69	181.33 ± 20.43	205 ± 23.92	196.5 ± 23.92	183.33 ± 22.95	180.83 ± 20.13	175.83 ± 17.75
ALP (U/L)	I	66.67 ± 7.47	62.5 ± 6.44	68.67 ± 6.3	65 ± 6.55	64.67 ± 6.15	66.5 ± 6.66	65.67 ± 6.32
	II	74 ± 5.88	126 ± 12.25**	136.83 ± 12.88**	119.33 ± 7.97**	84.5 ± 33.5*	80.5 ± 3.97	78.33 ± 2.98
Creatinine (ug/dl)	I	2.5 ± 0.22	2.17 ± 0.21	2.33 ± 0.21	2.17 ± 0.17	2.5 ± 0.22	2.17 ± 0.17	2.33 ± 0.21
	II	2.33 ± 0.21	8.33 ± 0.49**	10.83 ± 0.70**	9.67 ± 0.75**	6.00 ± 0.73**	3.33 ± 0.61	2.5 ± 0.22
Urea (g/dl)	I	35.33 ± 2.14	36.5 ± 1.88	36.5 ± 1.88	35.67 ± 1.6	36.17 ± 2.08	35 ± 1.83	35.67 ± 1.86
	II	40.83 ± 0.87	106.5 ± 6.06**	113.33 ± 50**	96.5 ± 4.42**	90.67 ± 3.92**	76.83 ± 4.88**	49 ± 1.0

n – 6 *P<0.05 **P<0.01 Group I – Control Group II – Treatment

all the animals within 12 to 24 h of administration. Thus the pilot studies revealed that 25 g/kg of *M. invisa* was toxic to rabbits and 30 g/kg produced acute toxicity resulting in death of animals. Hence the dose 25 g/kg of *M. invisa* was selected for further study.

The results of the toxicity study are presented in the table. The treatment group (*Mimosa invisa*, 25 g/kg) showed reduction in feed and water intake, the animals were dull and lethargic. Similar observation was made by Alex *et al.* (1991). The serum ALT levels showed significant increase (P<0.01) followed by gradual decrease from the third day onwards. Elevated levels of serum ALT levels were observed by feeding flower stem of *Narthecium ossifragum* which indicated intrinsic hepatotoxicity of the plants (Flaoyen *et al.*, 1997). Burtis and Ashwood (1996) reported that serum ALT levels will be increased in parenchymal liver diseases. They suggested that increase in serum AST levels observed may be associated with hepatic necrosis.

The serum GGT levels showed maximum increase on third day even though the increase was observed from first day onwards. Flaoyen *et al.* (1995) also noted an increase in serum GGT activity indicating hepatic dysfunction after feeding *N. ossifragum*. GGT present in the serum appears to originate from hepatobiliary system and it is elevated in all forms of liver diseases (Burtis and Ashwood, 1996). The serum creatine kinase (CK) levels were found to be significantly increased on the third day of the experiment followed by a decrease. A substantial increase in creatine kinase was observed in all types of muscular dystrophies. The serum ALP showed a significant increase (P<0.05) in treatment group which indicated liver damage. Highly significant (P<0.01) increase in serum creatinine and urea was observed in treatment group. Ferriera *et al.* (1991) reported increased levels of urea and creatinine in amaranthus poisoning in cattle. When urea is measured along with creatinine, it is a clear indicator of renal failure (Burtis and Ashwood, 1996). All the parameters except CK showed significant increase from first day onwards which is followed by a decrease and returned to normal values by 20th day. The increase in biochemical parameters indicated damages to liver, kidney and heart but the tendency to normalize the values indicated

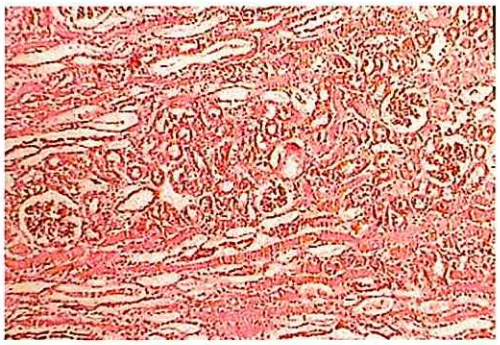

Fig.1. Kidney - Fresh Juice of *M. invisa* - tubular degeneration, necrosis and hyalinisation H & E x 100

tolerance acquired by the animal due to repeated administration of the toxic dose of *M. invisa*. Histopathological observations support the biochemical changes. The histopathological examination revealed degenerative and necrotic lesions in kidney (Fig.1). The liver showed fatty changes and necrosis (Fig.2). Intermuscular haemorrhages could be observed in heart (Fig.3). The histopathological changes were observed with higher dose (30mg/kg) of *M. invisa*. Flaoyen *et al.* (2001) observed tolerance to nephrotoxic component of *N. ossifragum* in sheep. Thus it is inferred

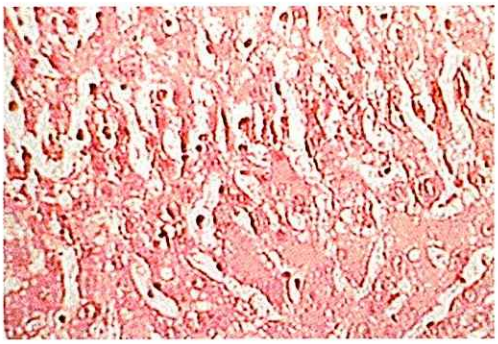

Fig. 2. Liver – Fresh juice of *M. invisa* - fatty change and necrosis H & E x 400

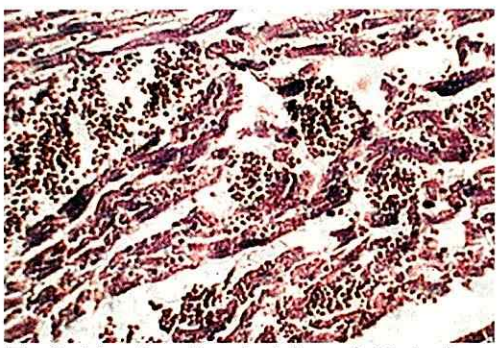

Fig.3. Heart - Fresh Juice of *M. invisa* - intermuscular haemorrhage H & E x 100.

that the fresh juice of *M. invisa* equivalent to 25 g/kg produced toxicity in rabbits but exhibited tolerance due to repeated administration. Higher dose (30 g/kg) of *M. invisa* produced acute toxicity resulting in death of rabbits.

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