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Research Article

HEPATOPROTECTIVE ACTIVITY OF EXTRACTS OF LEAVES OF CALOTROPIS GIGANTEA

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ABSTRACT

Calotropis gigantea L, belonging to family: Asclepiadaceae is also known as Sweat akand, is used in traditional medicine for treatment of various ailments. Leaf extracts of Calotropis gigantea were prepared by using various solvents like Petroleum ether, Acetone, Chloroform and Methanol in increasing polarity. The reference drug used was Silymarin. Hepatoprotective activity was studied by Acetaminophen induced hepatotoxicity. Since no such work has been investigated and reported in detail earlier, therefore an effort has been made to explore the hepatoprotective activity in this plant.

Key words: *Calotropis gigante,;* Silymarin, Paracetamol, Hepatoprotective.

INTRODUCTION

Calotropis gigantea L, belonging to family: Asclepiadaceae, also known as sweat akand is found throughout plains and lower hills of India usually near water found growing upto an altitude of 900m throughout India including Andamans [1, 2]. Various chemical constituents have been reported from different parts of the plant [3]. Flowers contain waxy matter which has esters of resinols, α-, β-calotropeol, β -amyrin, stigmasterol, giganteol, calotropin, a triterpenoid flavonoid, flavonoid glycoside, wax, acids and alcohols [4, 5]. Seeds are rich in amino acids, major being phenylalanine, lysine and histidine. The leaf contains ascorbic acid, ortho-pyrocatechic acid and also contains β -amyrin, taxasterol, tarasterol and beta-sitosterol [1]. Shoot and leaf extracts possess antibacterial activity. Tender fresh leaves have been reported to cure fits and convulsions in children. Extracts of leaf with oil and rock salt warmed are poured into ear for earache [1]. Fresh warmed leaves or poultice is bandaged on painful rheumatic [1]. Plant is purgative, antihelmintic, antitumor and has been used in diseases of spleen and liver [6]. Leaves have been used in enlargement of liver and flowers are also good for liver Paracetamol induced hepatic damage in rats has been reported [7]. Aerial parts were collected from medicinal garden of BBDNITM and authenticated by pharmacognostic, phytochemical and other studies while voucher (sample No. N.B.R.I/CIF/Re/08/2008/32) was deposited in taxonomy lab, Ethnopharmacology division, NBRI Lucknow for future reference. Healthy male Wistar rats each weighing 150-200g were used for study. The rats were housed in polypropylene cages and maintained under standard conditions (12 h light and dark cycles, at 25 ±3^{0}C and 35-60% humidity). Standard palletized feed and tap water were provided *ad libitum.*

PHARMACOLOGICAL SCREENING [8, 9]

Determination of acute toxicity and LD_{50} values

Wistar rats weighing 150-175 g of either sex, maintained under standard husbandry conditions, were used for all sets of experiments in groups of six animals. Animals were allowed to take standard laboratory feed and tap water. The relevant extracts were administered to respective groups of rats in doses ranging from 100-5000 mg/kg. There was no lethality in any of the groups. One tenth of the maximum dose of the extracts, tested for acute toxicity, was selected for evaluation of hepatoprotective activity [10], i.e., 2500 mg/kg. The experiments were performed as per protocols approved by Institutional Animal Ethics Committee (CPCSEA approval no.BBDNITM/IAEC/Clear/8/2008).

Paracetamol-induced hepatotoxicity [11, 12]

Animals were divided into seven groups of six animals each.

GROUP I- Normal control given only saline through oral route for seven days
GROUP II- Disease control-Treated with Paracetamol through oral route for seven days (2g/Kg).
GROUP III- Reference control–Diseased animals treated with Reference drug (Silymarin) through oral route for seven days (100mg/Kg).
GROUP IV- Diseased animals treated with Petroleum Ether Extract (450mg/kg).
GROUP V- Diseased animals treated with Acetone Extract (450mg/kg).
GROUP VI- Diseased animals treated with Chloroform Extract (450mg/kg).
GROUP VII- Diseased animals treated with Methanol Extract (450mg/kg).

On the fifth day, after the administration of the respective treatments, all the animals of test groups were administered with Paracetamol 2g/kg by oral route. On the seventh day, after 2 hrs of respective treatments the blood samples were collected for the estimation of biochemical marker enzymes that is S.G.O.T (Serum Glutamate Oxaloacetate transaminase), S.G.P.T (Serum glutamate pyruvate transminase), A.L.P (Alkaline phosphate) and Bilirubin by reported methods to assess liver functions [13].

Paracetamol induced liver damage causes increase in SGPT, SGOT, ALP and Bilirubin levels and also causes large areas of necrosis surrounded in focal distribution, lymphocytes and lot of homosiderin pigment. The Reference drug, chloroform extract, methanolic extract, showed very significant ($p<0.001$) reduction in SGPT level while Petroleum ether and acetone extracts did not show significant reduction. The methanolic extract of leaves of *Calotropis gigantea,* Standard drug Silymarin, showed very significant ($p<0.001$) reduction in SGOT level. Petroleum ether and Acetone extracts did not show significant reduction whereas Chloroform extract showed very significant ($p<0.01$) reduction. The A.L.P. level was reduced very significantly ($p<0.001$) by Silymarin, Chloroform, Methanolic extract. The Acetone extract showed significant ($p<0.01$) reduction in ALP level. Petroleum ether extract did not show significant reduction. Serum Bilirubin level was reduced very significantly ($p<0.001$) by Silymarin, Methanolic extract, Chloroform extract, whereas Petroleum ether extract and acetone showed only slightly significant reduction (Table 1).

CONCLUSION

From the above study it has been concluded that Paracetamol induced liver damage causes increase in SGPT, SGOT, ALP and Bilibrubin levels and also causes large areas of necrosis surrounded in focal distribution, lymphocytes and lot of homosiderin pigment.

S.G.P.T- The Reference drug, chloroform extract, methanolic extract, showed very significant ($p<0.001$) reduction in SGPT level. Petroleum ether and acetone extracts did not show significant reduction.

S.G.O.T- The methanolic extract of leaves of *Calotropis gigantea,* Standard drug Silymarin, showed very significant ($p<0.001$) reduction in SGOT level. Petroleum ether and Acetone extracts did

Table 1: Effect of various solvent extracts from *Calotropis gigantea* leaves on biochemical parameters in Acetaminophen induced hepatic injury in rats

Group(s)	Dose (mg/kg)	S.G.P.T (IU/L)	S.G.O.T (IU/L)	A.L.P (IU/L)	Bilirubin (mg/dl)
GROUP- I	0.5 ml	63.4±.702	101±.441	92.3±.397	0.773±.143
GROUP –II	2g/Kg	195± .607	345±.490	353±.441	3.49±.289
GROUP – III	100mg/kg	45.3±.382***	119±.440***	93.3±.379***	1.43±.297***
GROUP –IV	450mg/kg	180± .382	300±.382	282±.365	2.49±.262*
GROUP –V	450mg/kg	150± .382	275±.483	189±.382**	2.13±.220**
GROUP –VI	450mg/kg	61.1±.473***	179±.382***	150.0±.382***	2.0±.226***
GROUP –VII	450mg/kg	50.8±.527***	164±0.382***	115.0±0.441***	1.49±0.145***

Values are expressed as Mean ± SEM (n=6), p*<0.05, p**<0.01, p***<0.001

not show significant reduction whereas Chloroform extract showed very significant (p<0.01) reduction.

A.L.P- The A.L.P. level was reduced very significantly (p<0.001) by Silymarin, Chloroform, Methanolic extract.

The Acetone extract showed significant (p<0.01) reduction in ALP level. Petroleum ether extract did not show significant reduction.

Bilirubin- Serum Bilirubin level was reduced very significantly (p<0.001) by Silymarin, Methanolic extract and Chloroform extract, whereas Pet. ether extract showed only slightly significant reduction.

The Methanolic and Chloroform extract of leaves showed significant hepatoprotective activity against hepatic damage induced by Acetaminophen in experimental animals. However, Acetone and Petroleum ether extracts showed nominal response.

REFERENCE:

1. "Anonymous"(1998), The wealth of India, published by National Institute of Scientific and Industrial Research, New Delhi, India ,3, 78-84.
2. Kirtikar K, Basu B. D. (2001), Oriental enterprises, 7, 2218-2221.
3. Murti P. B, Seshadri T. R. (1945), Wax and Resin components of *Calotropis gigantean*. Proc. Indian Academic Sciences, 21,147-154.
4. Anjaneyalu V, Row L. R. (1968), The triterpenes of *Calotropis gigantean.* Current Sciences, 6,156-157.
5. De. S, Datta. S. K. (1988), Separation and HPLC identification of two cardiac glycosides from *Calotropis gigantean.* Indian Drugs, 25,167-168.
6. Verma P, Singh K. K. (1995), Ethnobotany, 7, 1.
7. Dhar M. L, Dhar M. M. (1968), Screening of Indian plants for biological activity. Indian Journal of Experimental Biology, 16,232-247.
8. Ghosh M. N. (1984), Fundamentals of experimental pharmacology, 2, 34.
9. Vogel G., Vogel H.," Drug discovery and evaluation, "Pharmacological assays, II, 3, 950-951.
10. Rasik A. M, Gupta A. (1999) Journal of Ethnopharmacology , 68,261.
11. Joel. G. H, Goodman-Gilman, (2001), The Pharmacological basis of therapeutics", 1884.
12. Chattopadhyay R. (2003), Possible mechanism of hepatoprotective activity of *Azadirachta indica* leaf extract. Indian Journal of Pharmacology, 89,217-219.
13. Setty R. S., Quereshi A. (2007), Hepatoprotective activity of *Calotropis procera* flowers against paracetamol induced hepatic injury in rats. Fitoterapia, 78, 451-454.