BIOEFFICIENCY OF INDIGOGERA TINCTORIA LINN. ON ISONIAZID INDUCED HEPATOTOXICITY IN ALBINORATS

M. Chitra, N. Muthusudha, R. Sasikala

Department of Biochemistry, S.T.E.T. Women's College Mannargudi – 641 001. Thiruvarur Dt. Tamilnadu

Received: 14-04-2003	Accepted: 14-08-2003
	1

ABSTRAT: *Indigofera tincoria* leaf extract has been evaluated for its anti-hepatotoxic activity on Rats. Isoniazid is a first line agent for treatment of tuberculosis. Acute ingestion by adults with little dose can lead to mild liver toxicity. In our study, administration of isoniazid (100mg/Kg of the body weight) to normal albino rats for 15 days, results in the induction of hepatitis, which is reversed by the leaf extract of *Indigofera tincoria*. Two different dose volumes of *Indigofera tincoria* (5ml/kg of the body weight and 10ml/kg of body weight) were given to determine the hepatoprotective efficacy. The effect of the extract was found to be dose dependent and the altered levels of AST, ALT, ALP and other serum parameters such as total protein, total bilirubin are showing normal values. *Indigofera tincoria* provided significant protection against most of the biochemical alterations produced by isoniazid in test animals

INTRODUCTION:

Management of liver diseases with out any side effects is still a challenge to the medical world. In the Indian system of medicine, there are several plants which are used clinically for the management of liver diseases¹. One such plant is Indigofera tincoria Linn. (Leguminosae papilonatae) and it is an erect, suffructicose, pubescent shrub, cultivated extensively in Northern India, especially in Bengal, Bihar, Orissa, Sind and Southern India and Madras². Indigofera tincoria is applied to the hypogastrium to promote the action of the bladder. Its leaves are recommended in various skin diseases³. It is also used in bites and strings of venomous insects and reptiles, to relieve the pain, and also to burn and scalds. Enlargement of the spleen and liver and palpitation of the heart can be minimized by *Indigofera tinctoria*⁴.

In allopathic medical practices, a drug known as isoniazid is used for tuberculosis therapy. Reports indicate that the patients of all ages may experience chronic or acute toxicity or side effects even at low dosage⁵. Our pilot study focuses on the efficacy of the *Indigofera tinctoria Linn* against isoniazid induced hepatotoxicity i.e. liver damage in rats.

MATERIALS AND METHODS

Indigofera tinctoria plant leaves were collected from the surrounding areas of Kattakkudi Village, Thiruvarur District, Tamilnadu. The leaves were washed and aqueous extract of *Indigofetra tinctoria* was prepared. Isoniazid was purchase from general medical store within the expiry date.

Swiss albino rats of either sex weighing between 100-150g were used for this experiment. These animals were taken from the in- bred group of animals in the animal

house. The animals were fed with standard pellet diet supplied by S ai Durga Feeds and Foods, Bangalore. Feed and water are made available ad *libitum*. Studies were carried out according to the recommendations of animal ethical committee.

Rats were divided into four different groups of 10 rats each. The group receiving water (10ml/kg) was kept as control. Group II was orally administered with isoniazid (100mg/kg of body weight). Group III orally received *Indigofera tinctoria* leaf extract (5 ml/kg of body weight) along with isoniazid administration. Group IV rats were treated similarly like group III. But, the dose level of *Indigofera tinctoria* was high (10 ml/kg of body weight).

The experiment was carried out for 15 days and the blood collected at 72 hrs interval for the biochemical investigations (i.e. 3rd, 6th, 9th, 12th, 15th day of the experiment) Serum biochemical parameters such as AST, ALT, ALP, total bilirubin and protein were analysed.

AST, ALT, activities were estimate by using 2, 4-Dinitrophernyl hydrazine method⁶. ALP activities were determined by king and Armstrong method⁷. Total bilirubin was measured by Malloy and Evelyn method⁸. Total protein was measured by the method of Biuret⁹. Data were expressed as mean \pm standard error and stastical analysis was carried out by using student's t test ¹⁰. P values less than 0.05 were considered as significant.

RESULTS AND DISCUSSION

Biochemical parameters reflected marked changes in various enzymatic and nonenzymatic parameters of isoniazid and *Indigofera tinctoria* treated rats (table-1). After isoniazid administration, AST, ALT, ALP and total bilirubin levels are increased followed by a decreased serum total protein level.

The above parameters were reversed to its normal level in Indigofera tinctoria treated groups (Group III and Group IV) compared to isoniazid treated group (Group II). The high dose level to Indigofera tinctoria extract provides a considerable reduction of AST, It may be due to the ALT, and ALP. regeneration of hepatocytes and reduction of leakage of the above liver enzymes into the blood, thereby lowering its value to normal level¹¹. Herbal treatment provides considerable charges in the level of total bilirubin, when compared to isonoazid administered group. The serum protein level is an index of hepatic damage¹². Isoniazid treated group shows decline in protein level. After treatment with the high dose of Indigofera tinctoria extract, decline in protein level is increased to that of normal control, which may indicate the accelerated synthesis of protein in liver that shifts to normal level.

Indigofera tinctoria extract at both dose levels showed a marked hepatoprotective effect on albino rats. On the basis of change in the activity of hepatic enzymes, it seems that *Indigofera tinctoria* provides certain amount of protection and it corrects the liver dysfunction .However, the mechanism of action of the herb is not clear.

On the basis of experience gained during our study, we are surprised with beneficial effects of *Indigofera tinctoria Linn* against isoniazid. Long – term investigation should be done to know more about the effects of *Indigofera tinctoria Linn* against hepatotoxicity.

ACKNOWLEGMENT.

Authors are thankful to Mr. V. Dhivakaran, Correspondent, S.T.E.T Women's College, Mannargudi and Dr. S. Rajasekaran, Lecture in Biochemistry, J. J, Collage of Arts and Science, Pudukkottai for their valuable cooperation and guidance.

REFERENCES

- 1. Gupta, S.S 'Prospects and perspectives of natural plant products in Medicine' *Indian J of Pharm.* 26: 1-12 (1994)
- 2. Sreeepriya, M., Devaki, T. and Nayeem, M.'Protective effects of *Indigofera tinctoiria L.* against D-galactosamine and carbon tetra chloride chllange on 'insit' perfused rat liver'. *Indian J Physiol Pharmacol*; 45(4): 428-434 (2001).
- 3. Warrier, P.K., Nambiar, V.P.K. and Ramankutty, C., Indian Medical Plants-A compendium of 500 species Vol.3', pp 210, Orient Longman Publication, Hyderabad (1995)
- 4. Chopra, R.N., Nayar, S.L., and Chopra, I.C., 'Glossary of Indian Medical Plants CSIR, New Delhi, 141(1974).
- 5. Zimmerman, H.J., 'Hepatitis Injury caused by therapeutic agent in the liver'. Marcel Dekker, New York, 225 (1974).
- 6. Mohun, A.F. and Cook, I.J.Y., `Assay of AST, ALT', J.Chin.Path, 10 (1934).
- 7. King, E.J., Armstrong, A.R., 'Assay of ALP', Canad. Med. Assoc, (31) 376, 1934.
- 8. Malloy, H.T., Evelyn K.A., J.Bio. Chem.119 (481).
- 9. Reinhold, J.G. 'Measurement of Total Protein, Albumin and Globulin,' Standard methods of Clinical Chemistry, Academic Press, New York, 88 (1953).
- 10. Fisher, R.A., 'Statistical methods for research workers', Oliver and Boyd, U.K,(1950).
- 11. Kiso, Y.Suzuki, Y., Watanabe, N., Oshima, Y. and Hilcaino. H.'Antihepatotoxic principles of curcuma longa rhizomes.' Journal of Medical Plant Research, 49 (185), (1983)
- 12. Keppler, D., Lesch, R., Reutter, W., and Decker, K. `Experimental hepatitis induced by D.galactosamine'. Exp.Mol.Pathol, 9 (277), (1968).

		BIOCHEMICAL PARAMETERS					
DAY	GROUP	AST	ALT	ALP	TOTAL	TOTAL	
					BILIRUBIN	PROTEIN	
3	Ι	14.2 ± 0.127	18.86 ± 0.48	248.6 ± 1.02	0.51 ± 0.009	6.4 ± 0.19	
	II	$20.2\pm~0.06$	37.23 ± 0.12	294.5 ± 0.55	1.5 ± 0.05	5.9 ± 0.04	
	III	19.0 ± 0.07	34.26 ± 0.72	278.0 ± 0.55	1.44 ± 0.024	6.07 ± 0.03	
	IV	16.4 ± 0.37	30.6 ± 0.57	251.0 ± 2.76	1.31 ± 0.02	6.24 ± 0.03	
6	Ι	-	-	-	-	-	
	II	32.75 ± 0.74	61.23 ± 0.45	410.0 ± 0.25	1.71 ± 0.1	5.85 ± 0.024	
	III	32.55 ± 0.14	44.6 ± 0.17	314.0 ± 1.45	1.59 ± 0.04	6.18 ± 0.023	
	IV	28.25 ± 0.73	37.5 ± 0.23	294.7 ± 0.41	1.4 ± 0.024	6.29 ± 0.028	
9	Ι	-	-	-	-	-	
	II	49.0 ± 0.612	68.3 ± 0.28	484.5 ± 0.9	1.76 ± 0.25	5.66 ± 0.028	
	III	41.0 ± 1.12	61.0 ± 0.14	321.7 ± 1.3	1.24 ± 0.023	6.22 ± 0.07	
	IV	30.5 ± 0.55	40.3 ± 0.72	304.7 ± 3.8	1.07 ± 0.014	6.28 ± 0.05	
12	Ι	-	-	-	-	-	
	II	49.5 ± 0.75	61.2 ± 0.124	502.0 ± 1.54	1.24 ± 0.24	5.36 ± 0.01	
	III	32.75 ± 0.7	59.76 ± 0.35	410.9 ± 0.3	1.06 ± 0.25	6.276 ± 0.023	
	IV	22.5 ± 1.52	52.3 ± 0.36	384.0 ± 0.79	0.7 ± 0.04	6.72 ± 0.014	
15	Ι	-	-	-	-	-	
	II	48.0 ± 0.45	52.43 ± 0.43	491.7 ± 1.08	0.9 ± 0.02	5.24 ± 0.02	
	III	29.0 ± 0.73	39.7 ± 0.3	384.2 ± 0.73	0.86 ± 0.24	6.376 ± 0.011	
	IV	15.12 ± 0.36	27.6 ± 0.27	256.7 ± 1.29	0.61 ± 0.015	7.13 ± 0.049	

TABLE :1

The level of AST, ALT and ALP are expressed in IU/L. The level of total protein and total bilirubin are expressed in mg/dl.

No. of animals in each group = 10

Values are in the form of mean \pm Standard error.

Significance : P<0.05

GRAPH – 1 Effect of INH and *IT* on Changes in the levels of SGOT in Albino Rats



A - INH Treated Control

B - Low Dose (INH + IT)

C – High Dose (INH + *IT*)

Each values is mean from 10 Animals

GRAPH – 2 Effect of INH and *IT* on Changes in the levels of SGPT in Albino Rats



N-Control

A - INH Treated Control

B - Low Dose (INH + IT)

C – High Dose (INH + IT)

Each values is mean from 10 Animals

GRAPH – 3 Effect of INH and *IT* on Changes in the levels of ALP in Albino Rats



- A INH Treated Control
- B Low Dose (INH + IT)
- C High Dose (INH + IT)

Each values is mean from 10 Animals

GRAPH – 4 Effect of INH and *IT* on Changes in the levels of Total Bilirubin in Albino Rats



A - INH Treated Control

B - Low Dose (INH + IT)

C – High Dose (INH + IT)

Each values is mean from 10 Animals

GRAPH – 5 Effect of INH and *IT* on Changes in the levels of Total Protein in Albino Rats



A - INH Treated Control

B - Low Dose (INH + IT)

C – High Dose (INH + IT)

Each values is mean from 10 Animals