

# Hepatoprotective Activity of the Leaves of *Nyctanthes arbor-tristis* Linn.

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The decoction of the leaves of *Nyctanthes arbor-tristis* Linn. of Oleaceae widely used in Ayurvedic system of medicine for the treatment of sciatica, arthritis, fevers, various painful conditions and diuretics, liver disorders and as laxative. The aim of the present study was to evaluate the alcoholic and aqueous extracts of the leaves of *Nyctanthes arbor-tristis* for hepatoprotective effect against carbontetrachloride-induced liver damage in rats. Administration of alcoholic and aqueous extracts of the leaves of *Nyctanthes arbor-tristis* protect the liver from toxic effects of carbontetrachloride by reducing the elevated levels of Serum glutamate pyruvate transaminase, Serum glutamate oxaloacetate transaminase and serum bilirubin (total and direct). Results revealed that both the alcoholic and aqueous extracts showed significant hepatoprotective activity by reducing the elevated levels of biochemical parameters at a dose of 500 mg/kg body weight. The results were supported by histopathological studies of liver samples which showed regeneration of hepatocytes by the extracts.

Liver plays a major role in detoxification and excretion of many endogenous and exogenous compounds, any injury to it or impairment to its functions may lead to many implications on one's health. Management of liver disease is still a challenge to the modern medicine<sup>1,2</sup>. Modern medicine has little to offer alleviation of hepatic ailments; where as most important representatives are of phytoconstituents. *Nyctanthes arbor-tristis* Linn. is a large shrub which is widely cultivated throughout India as a garden plant. The bitter leaves are used in traditional system of medicine for the treatment of rheumatism, sciatica and intestinal worms. The powdered seeds are recommended for the treatment of scurvy<sup>3-5</sup>. In this study an attempt was made to provide scientific backing to the traditional claims.

The leaves of *Nyctanthes arbor-tristis* were collected from the local areas of Hubli and Belgaum in the month of April and the same was authenticated at Department. of Botany, Karnataka University, Dharwad. The dried powdered leaves were exhaustively extracted with 95% ethanol in a Soxhlet apparatus and also macerated with chloroform water for 7 days. The extracts were further concentrated in vacuum under pressure using rotary flash evaporator and dried in desiccator.

Both the extracts were suspended in water using 1% Tween-80 and subjected for hepatoprotective activity in

CCl<sub>4</sub>-induced hepatotoxicity. Acute toxicity studies were conducted by using albino mice of either sex weighing between 20 and 25 g and of 90 days age. The animals were fasted over night prior to the experimental procedure. The method of Up and Down or 'Staircase' was used to determine the dose<sup>6</sup>, Tween-80 (1%) was used as a vehicle to suspend the extracts. Wistar rats (150-200 g) of either sex were used for hepatoprotective activity. The animals were grouped into five groups of six animals each and maintained on standard diet and water, *ad libitum*. All the animal experimental protocol has been approved by the Institutional Animal Ethics Committee.

Hepatoprotective activity<sup>7</sup> was carried out using Wistar rats (150-200 g) of either sex. The animals were divided in to five groups of six animals each and maintained on standard diet and water, *ad libitum*. Tween-80 (1%) was given to groups 1 and 2 as a vehicle for 10 days by oral route. Liv-52 was administered to group 3 at the dose of 1 ml per kg body weight by oral route for 10 days. Ethanol and aqueous extracts were administered to groups 4 and 5, respectively at a dose of 500 mg/kg by oral route for 10 days. CCl<sub>4</sub> at a dose of 0.7 ml per kg body weight was injected to animals of groups 2, 3, 4 and 5 on 3<sup>rd</sup>, 6<sup>th</sup> and 10<sup>th</sup> day by intraperitoneal route. On 10<sup>th</sup> day, 1 h after the last dose of Carbon tetrachloride injection, animals were sacrificed by cervical dislocation and the blood was collected from the carotid artery, serum was separated and used for the estimation of various biochemical parameters.

Biochemical parameters<sup>8</sup> such as glutamate oxaloacetate

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**TABLE 1: EFFECT OF NYCTANTHES ARBOR-TRISTIS LINN. ON CCL<sub>4</sub>-INDUCED HEPATOTOXICITY IN RATS**

Group	Dose mg/kg	SGPT (IU/L)	SGOT (IU/L)	ALP (IU/L)	Bilirubin mg/dl	
					Total	Direct
Control	-	158.2±3.499	227.4±7.054	12.32±1.930	0.74±0.04	0.22±0.02
CCl <sub>4</sub>	0.7	273.2±3.455*	297.4±16.567*	15.22±0.205	1.4±0.07*	0.22±0.02
Standard	1.0	160.8±2.131**	226.6±2.441**	12.72±0.159	0.78±0.02**	0.26±0.02
Alcoholic extract	500	161.4±3.076**	229.4±3.541**	12.94±0.139	0.84±0.02**	0.22±0.02
Aqueous extract	500	160.2±1.844**	236.2±3.736**	12.88±0.164	0.84±0.02**	0.22±0.02

All values are expressed as Mean±SEM, (n=6), \*P<0.01 when compared with control, \*\*P<0.01 when compared with carbon tetrachloride

transaminase, glutamate pyruvate transaminase, alkaline phosphatase (ALP) and serum bilirubin (total and direct) were determined (Table 1). Liver was excised quickly fixed in 10% formalin and then fixed in bovine solution, they were processed for paraffin embedding following the standard micro technique. Sections of liver were stained with haematoxylin-eosin and were observed microscopically for any histopathological changes.

The mean value±SEM was calculated for each parameter, each parameter was analyzed separately using ANOVA followed by Dunnett's 't' test. It is revealed that the alcoholic and aqueous extract contains flavonoids, sterols, tannins, carbohydrates and glycosides (flavonoidal). Results revealed that both the alcoholic and aqueous extract of leaves of *Nyctanthes arbor-tristis* Linn exhibited an ability to counter act the CCl<sub>4</sub>-induced hepatotoxicity by decreasing the elevated enzyme levels in the blood compared to the CCl<sub>4</sub> group (P<0.01).

Histopathology of liver from normal control group shows prominent central vein, normal arrangement of hepatic cells. Microscopical examination of carbon tetrachloride treated liver section shows various degrees of pathological changes starting from centrilobular necrosis of hepatic cells and central lobular fatty regeneration. Liver section of standard treated and from *Nyctanthes arbor-tristis* treated groups shows moderate protection in CCl<sub>4</sub>-induced liver damage.

Since the results of hepatoprotective activity showed a significant decrease in the elevated levels of serum enzymes and histopathological results showed a significant regeneration of hepatocytes. Thus, from the studies we may conclude that the ethanolic and aqueous extracts of the leaves of *Nyctanthes arbor-tristis* Linn. can be used as hepatoprotective. The results were also comparable with standard drug.

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