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Research Article

HEPATOPROTECTIVE ACTIVITY OF *EVOLVULUS ALSINOIDES* LINN. ON PARACETAMOL INDUCED RATS

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ABSTRACT
Present study was aimed to Hepatoprotective Activity with fractions of *Evolvulus alsinoides* extracts on paracetamol induced Rats. Traditionally this plant used in various types of liver disorders like antihypertensive, hair growthing, antioxidants etc. prepared with various fractions of *Evolvulus alsinoides*; conducted acute toxicity study on mices to identifying of LD50 value. By using various fractions to conducted Hepatoprotective activity by paracetamol induced method. The blood samples were collected for various biochemical parameters and dissected the liver for histopathological studies. With the above biochemical parameters toxic group of Paracetamol showed the elevated levels of SGPT, SGOT, ALP, CHOL and TBL where as decreased TP and ALB levels when compared with the control group. When fractions of *Evolvulus alsinoides* produced significant inhibition of hepatic damage by significantly ($P < 0.01$) reversing the effects of Paracetamol induced hepatotoxicity. Histopathological studies revealed that of *Evolvulus alsinoides* exhibited a remarkable recovery as Silymarin does. The results of this study strongly indicate that leaves of *Evolvulus alsinoides* have potent hepatoprotective against Paracetamol.
Keywords: *Evolvulus alsinoides,* Paracetamol, Silymarin.

INTRODUCTION

Liver is the largest glandular organ of the body and 1/50th of the body weight; it performs more than 500 metabolic functions, to regulate various physiological processes of internal chemical environment in the body. Liver injury mainly caused by toxic chemicals, excess consumption of alcohol, infections and autoimmune disorders. Most of the hepatotoxic chemicals damage liver cells mainly by inducing lipid peroxidation and other oxidative damages[1]. In the absence of reliable liver protective drugs in modern medicine there are a number of medicinal preparations in Ayurveda recommended for the treatment of liver disorders and their usage is in vogue since centuries[2]. In India, of the 17,000 species of higher plants, 7500 are known for medicinal uses. Currently, approximately 25 % of drugs are derived from plants. Herbal medicines have recently attracted much attention as alternative medicines useful for treating or preventing life style related disorders and relatively very little knowledge is available about their mode of action. The use of natural remedies for the treatment of liver diseases has a long history, starting with the Ayurvedic treatment, and extending to the Chinese, European and other systems of traditional medicines[2]. *Evolvulus alsinoides* Linn (Convulvulaceae)[3], whole plant is Widely distributed in tropical and subtropical regions throughout the world. It grows commonly as a weed in open and grassy places throughout India, ascending at 6000 ft. Traditionally this plant is used in many ways like, decoction with cumin and milk in fever and malarial fever, nervous debility, loss of memory and syphilis, leaves are made into cigarettes and smoked in chronic bronchitis and asthma, oil promotes the growth of hair[4]. strengthen the brain and memory[5] and also variety of other medical applications, including use as an adaptogenic, antiphlogistic, antipyretic, antiseptic, aphrodisiac, febrifuge, stomachic, tonic, and vermifuge, in the treatment of asthma, bronchitis, scrofula, syphilis, or in "controlling night emissions," and to promote wound healing[6-8]. Based on its traditional system of medicine this plant is used in liver diseases (jaundice). Hence the present aim of the study was to investigate the hepatoprotective activity of fractions of ethanolic extract of *Evolvulus alsinoides* Linn (EAEE) investigated in Paracetamol induced model in Albino Wistar rats.

MATERIALS AND METHODS

Plant materials

Evolvulus alsinoides whole plant were collected from the field of thirumala hills and the whole plant was authenticated by Dr. K. Madhava chetty, Professor, Department of Botany, Sri Venkateswara University, Thirupathi, Andhra Pradesh, India.

Preparation of extracts

Whole plant of *E. alsinoides* Linn were made free from foreign material, air dried and coarsely powdered. Prepared the ethanolic extract by using Soxhlet apparatus and remove moisture and done the successive fractions with polarity based and stored it properly until used.

Animals

Albino Wistar rats weighing 150-180 g were purchased from Animal sciences, TEENA Labs, HYD. (Regn. No 1533/PO/a/11/CPCSEA.), Hyderabad, India and maintained in the animal house. Animals were provided with standard rodent pellet diet and the food was withdrawn 18-24 h before the experiment, water was allowed *ad libutum*. They were maintained at standard laboratory conditions (27 ± 2 ^{0}C) 12 h light- dark cycle throughout the period of acclimatization and experimentation.

Acute Toxicity Studies

Healthy Wistar albino mice of 20-30 g either sex were selected. Acute toxicity study was carried out according to the method described in the literature[9,10]. The extracts of *E. alsinoides* were suspended in 2 % w/v gum acacia, administered orally to albino mice. The animals were observed continuously for any change in autonomic or

behavioral responses for first few hours and later at 24 h intervals for a period of 48 h. At the end of this period, the mortality rates in all groups were noted. Mortality was noticed in the dose of 1000 mg/kg. The LD_{50} of the extracts was found to be 100 mg/kg body weight. One-tenth of this dose was selected as the therapeutic dose for the evaluation

Evaluation of protective effect of selected active fractions against Paracetamol Induced Liver Damage

The protective effect of selected fractions against paracetamol-induced liver damage was carried out in healthy albino wistar rats by the method explained by Jafri *et al* (1999). The animals maintained under standard conditions and were divided into six groups. The animals in various groups except those in toxic group were first treated with vehicle/Silymarin/test fractions orally for 7 days and on the 8th day, an acute oral dose of paracetamol (3 g/kg.b.w) in 1 % w/v gum acacia was given for inducing liver damage. Silymarin and plant fractions were dispersed in 2 % w/v of gum acacia in water, whereas suspension of paracetamol was prepared in 1 % w/v of the same suspending agent[11].

Control group received the vehicle alone (2 % w/v gum acacia 1 ml/kg body weight per oral) for 8 days.

Toxic group received the vehicle for 7 days followed by paracetamol (3 g/kg. b.w.) in 1 % gum acacia on the 8th day alone.

Standard group received with 50 mg/kg of Silymarin p. o. for 7 days followed by paracetamol (3.0 g/kg.b.w.) in 1 % gum acacia on the 8th day.

Test groups received 100 mg/kg b.w.p.o of the selected fractions i.e. TF-EAEE, BNF-EAEE and BLF-EAEE, by oral route for 7 days, followed by paracetamol (3.0 g/kg.b.w.) in 1 % w/v gum acacia on the 8th day. The total duration of the study was 8 days and the administration of fractions, standard, vehicle or paracetamol was only once on the days specified. The blood was withdrawn 24 h after the administration of paracetamol. The withdrawal of blood, separation of serum by centrifugation at 3000 rpm for 30 minutes and then analyzed biochemical parameters of SGPT, SGOT,ALP, TB, ALB,TP and CHOL levels were estimated by their specific methods. Then animals were then dissected and the livers were carefully removed and washed with 0.9 % saline solution and preserved in formalin solution (10 % formaldehyde) for histopathological studies.

Histopathological examination

For histopathological studies the liver sections were prepared 3-5 mm thick, stained with alum hematoxylin and eosin (Okuno *et al*., 1986) and examined microscopically for histopathological changes.

Statistical analysis

Values are expressed in Mean ± S.E.M. for six animals in each group and statistically assessed by one-way analysis of variance (ANOVA) and subjected to Dunnett's test. The $P < 0.05$ was considered significant.

RESULTS

The Biochemical Parameters of the hepatoprotective studies are given in Table 1 and Figure 1. From the above results Paracetamol i.e., the administration of Paracetamol induced acute liver damage which was well indicated by increased SGPT, SGOT, ALP, CHOL and TBL when compared with the control group. As well as those the animals receive Paracetamol cause to decrease in the total protein and albumin levels. The pretreatment of fractions of ASEE at a dose of 100 mg/kg exhibited reduction in the serum levels TF-EAEE<BLF-EAEE<BNF-EAEE were also increased and statistically significant when compared to the toxic groups. The administration of Paracetamol to the animals resulted in a marked increase in hepato specific enzymes (SGOT, SGPT and ALP), total bilirubin and cholesterol. However, the serum total protein level and albumin was decreased. The toxic effect of Paracetamol was controlled in the animals treated with the ethanolic extract by the way of restoration of the levels of the liver function biochemistry similar to that of the standard drug silymarin (Table 1). Among the extract treated groups, significant hepatoprotective activity was observed in those treated with extract compounds. Histological profile mentioned in Figure 2, Control group animals showed normal hepatocytes. Toxic group animals liver section showed centrilobular necrosis, Haemmahroages and Inflammatory cells and macro vesicular fatty change. Standard group liver section showed significantly normal architecture reduced necrotic areas, which was similar to that of control. Animals treated with TF-EAEE and BNF-EAEE exhibited significant liver protection against the toxicant by showed less reduced Haemmahrages, absence of necrotic areas and normal hepatic cords. As well as BLF-EAEE treated animals exhibited normal architecture and reduced accumulation of fatty lobules.

DISCUSSION

E. alsinoides L. is traditionally used as medicine in East Asia, and also is in Ayurveda as a brain tonic in the treatment of neurodegenerative diseases, asthma, malarial fever, nervous debility and growth hair, loss of memory, syphilis and amnesia[12]. In Southern Western Ghats of India, whole plant of *E. alsinoides* is used for the treatment of venereal diseases[13], spermopiotic[14]. Plant contains alkaloids, volatile oil and yellow neutral fat. In the present investigation, fractions of ethanolic extracts of *E. Alsinoides* were screened for hepatoprotective activity in rats. In acute toxicity study, no mortality occurred within 48 h up to a dose level of 1000 mg/kg b.w.p.o. with fractions of ethanolic extracts of *E. alsinoides*. The LD_{50} was 100 mg/kg was selected for further studies. In this study Paracetamol were used as induction of liver damage. Paracetamol is a common analgesic and antipyretic agent, which is safe in therapeutic doses but can produce fatal hepatic necrosis in man, rats and mice with toxic doses[15,16]. Hepatotoxicity of paracetamol has been attributed to the formation of toxic metabolites when a part of paracetamol is activated by cytochrome P-450 to form a highly reactive metabolite N-acetyl-p-benzoquinanoneimine[17]. Due to liver injury, the transport function of the hepatocytes gets disturbed, resulting in the leakage of the plasma membrane, thereby occurring an increased hepato specific enzymes, TB and CHOL with a reduction in TP and ALB levels in serum. Pre treatment of rats with 100 mg/kg of the three test fractions (TF-EAEE 100, BLF-EAEE 100 and BNF-EAEE 100) resulted in a significant protection against paracetamol induced alteration in the serum levels.

Table 1: Hepatoprotective activity of fractions of EAEE on different biochemical parameters in Paracetamol induced liver damage in rats

Groups	SGOT (IU/L)	SGPT (IU/L)	ALP (KA/dL)	TB (mg/dL)	CHOL(mg/dL)	ALB (g %)	TP (g %)
Normal	33.90 ± 2.67	28.04 ± 3.72	31.98 ± 1.60	0.52 ± 0.07	57.04 ± 5.76	3.93 ± 0.14	6.29 ± 0.27
Toxic (CCl_4)	130.8 ± 9.88	118.7 ± 5.59	112.6 ± 9.18	2.27 ± 0.16	121.8 ± 1.34	1.09 ± 0.14	3.05 ± 0.08
Silymarin 50 mg/kg	65.21 ± 3.50***	57.87 ± 3.35***	46.03 ± 7.07***	0.87 ± 0.17***	70.90 ± 3.82***	3.38 ± 0.22***	5.44 ± 0.28***
TF- ASEE 100 mg/kg	94.86 ± 9.04*	97.26 ± 6.05	90.97 ± 4.32	1.49 ± 0.15**	101.1 ± 4.30*	2.45 ± 0.41**	4.13 ± 0.09**
BNF-EAEE 100 mg/kg	97.41 ± 8.11*	87.12 ± 3.12**	88.25 ± 4.18	1.60 ± 0.08**	94.24 ± 3.17**	2.52 ± 0.16**	3.91 ± 0.23*
BLF -EAEE 100 mg/kg	71.41 ± 3.72***	76.42 ± 7.10***	67.44 ± 5.75***	1.11 ± 0.09***	77.76 ± 3.20***	3.25 ± 0.28***	4.34 ± 0.17***

n = 6, values expressed as Mean ± SEM Significant*(P < 0.05), **(P < 0.01), ***(P < 0.001) compared with standard and toxic group using one-way ANOVA (Dunnett's test method)

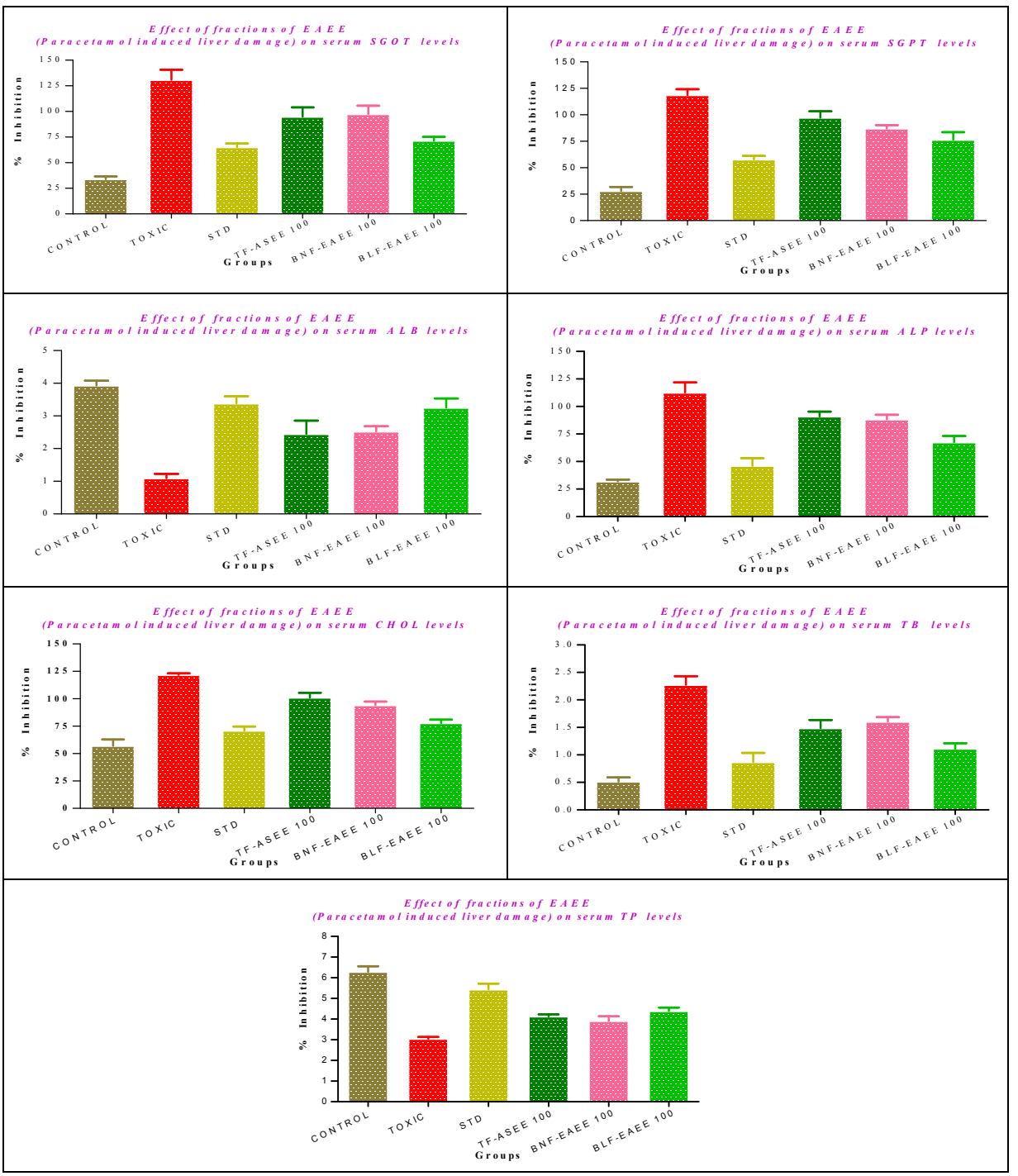

Figure 1: Column diagrammatic representation of Effect of fractions of EAEE Hepatoprotective on different biochemical parameters in Paracetamol induced liver damage in rats

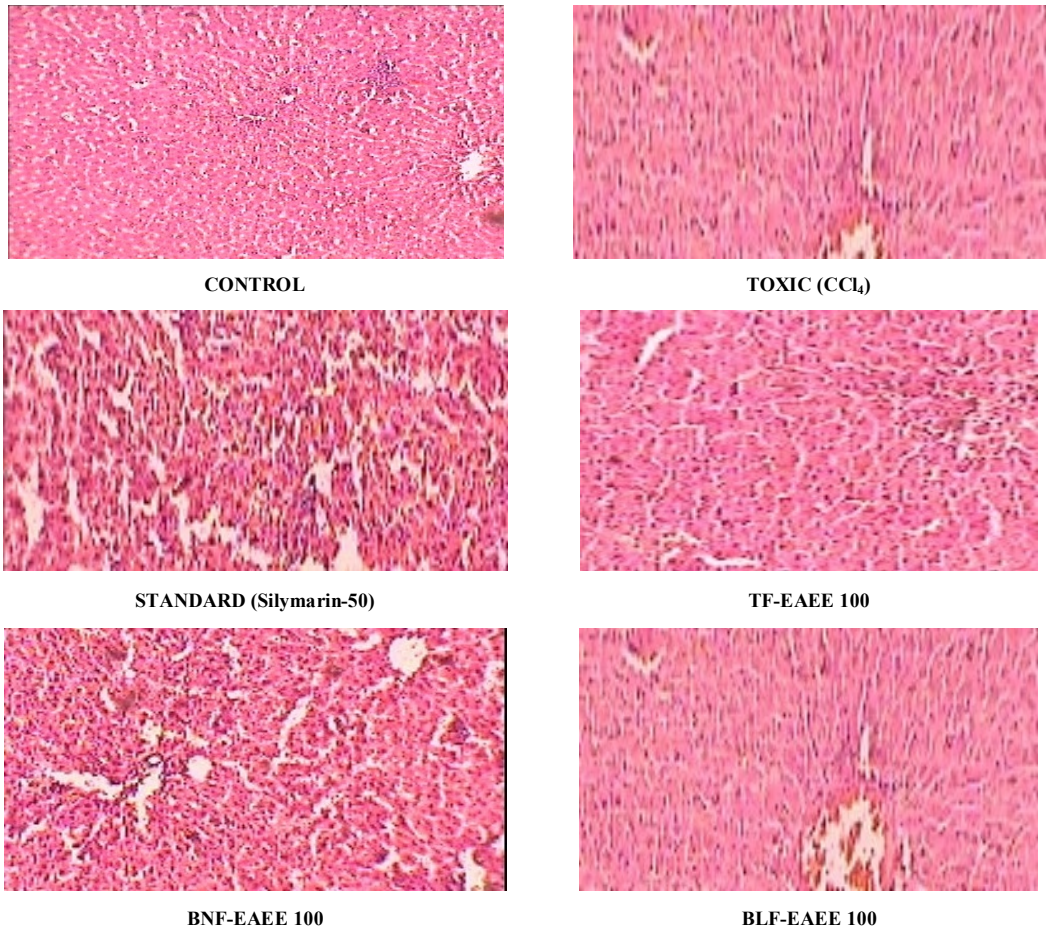

Figure 2: Effect of fractions of EAEE on histopathological changes in paracetamol induced liver damage

The histopathology of liver of rats treated with the three test fractions showed a marked protection against paracetamol induced damage of centrilobular vein with focal necrosis and ballooning degeneration of hepatic parenchyma. Thus results of the biochemical and histopathological parameters of the study are substantiating each other the hepatoprotective effect of the three test fractions. Further, it is evident from the results that the hepatoprotective effect of the test fraction BLF-EAEE 100 was well comparable to that of silymarin (50 mg/kg), a reference hepatoprotective drug.

CONCLUSION

The Fractions of ethanolic extracts of the whole plant *E. alsinoides* is widely used in folk medicine for treatment of liver disorders. From the above studies of EAEE possessed strong hepatoprotective activity in paracetamol induced rat model. The hepatoprotective activity of *E. alsinoides* is may be due to its free radical-scavenging antioxidant activity, presence of flavonoids and triterpenoide as a chemical compounds in the extracts.

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REFERENCES

1. Chatterjee TK. Herbal Options. Calcutta: Books and Allied (P) Ltd; 2000. p. 155.
2. Mohammed Sallem TS *et al*., Review of hepatoprotective herbs. Inter. Journal of Research in Pharmaceutical Sciences 2010; 1(1): 1-5.
3. Prajapati, Purohit Shrama, Kumar. A hand book of medicinal plants; 2003.
4. Singh B, Saxena AK, Chandan BK, Anand KK, Suri OP, Suri KA, Satti NK. Hepatoprotective activity of verbenalin on experimental liver damage in rodents. Fitoterapia 1998; 69: 135-140.
5. Watt G. A Dictionary of the Economic Products of India by Government of India. Delhi: Reprinted by Cosmo publications; 1972.
6. Daniel FA. Review of *Evolvulus alsinoides* an American herb in the old world. Journal of Ethno pharmacology 2008; 117: 185-198. http://dx.doi.org/10.1016/j.jep.2008.01.038
7. Auddy B, Ferreira M, *et al*., Screening of Antioxidant activity of some three Indian medicinal plants traditionally used for the management of neurodegenerative diseases. Journal of Ethno pharmacology 2003; 84: 131-138. http://dx.doi.org/10.1016/S0378-8741(02)00322-7
8. Kritikar KR, Basu BD. Indian Medicinal Plants. Vol III. International book distributors, Dehradun, India; 1933.
9. Parameshwar *et al.*, Hepatoprotective effect of methanolic extract of the leaves of *Kydia calycina* on carbon tetrachloride induced hepatotoxicity in albino rats. African Journal of Pharmacy and Pharmacology 2011; 5(16): 1920-1924. http://dx.doi.org/10.5897/AJPP11.537
10. Palanichamy S, Nagarajan S. Anti inflammatory activity of *Cassia alata* leaf extract and kaempferol- 3-ortho sophoroside. Fitoterapia 1990; 61: 44-47.
11. Jafri MA, Jalis Subhani M, Kalim Javeed, Surendar Singh. Hepatoprotective activity of leaves of *Cassia occidentalis* against paracetamol and ethyl alcohol intoxication in rats. Journal of Ethno pharmacology 1999; 66: 355-361. http://dx.doi.org/10.1016/S0378-8741(99)00037-9
12. Goyal PR, Singh KP. Shankhpuspi (*Evolvulus alsinoides* Linn.): a medicinal herb. Inter Journal Mendel 2005; 22: 124.

13. Ayyangar M, Ignacimuthu S. Traditional knowledge of Kani tribals in Kouthalai of Tirunelveli hills, Tamil Nadu, India. Journal of Ethno pharmacology 2005; 102: 246-55. http://dx.doi.org/10.1016/j.jep.2005.06.020
14. Hegde HV, Hegde GR, Shriparhi V, Kholkute SD. Herbal care for reproductive health. Ethno medico botany from Uttara Kannada district in Karnataka, India. Complete Therapeutic Clinical Practice 2006; 13: 38–45. http://dx.doi.org/10.1016/j.ctcp.2006.09.002
15. Mitchell JR, Jallow DJ, Potter WZ, Gillette JR, Brodie BN. Acetaminophen-induced hepatic necrosis 1, Role of drug metabolism. Journal of Pharmacology and Experimental Therapeutics 1973; 187: 185-194.
16. Prescott LF, Wright N, Roscoe P, Brown SS. Plasma paracetamol half life and hepatic necrosis in patients with paracetamol overdose. The Lancet I 1971; 5: 519-522. http://dx.doi.org/10.1016/S0140-6736(71)91125-1
17. Vermeulen NPE, Bessems JGM, Van De Streat R. Molecular aspects of paracetamol-induced hepatotoxicity and its mechanism based prevention. Drug Metabolism Review 1992; 24: 367–407. http://dx.doi.org/10.3109/03602539208996298

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