International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

# Pharmacological Screening of Hepatoprotective Activity of Eclipta Alba Leaves

Umesh kumar
*Department of Pharmacy, MJPRU, Bareilly, Uttar Pradesh, India*

Date of Submission: 15-09-2021 Date of Acceptance: 28-09-2021

**ABSTRACT**
In the present study, the ethanolic extract of Ecliptaalba leaves (medicinal plants) was screened for their hepatoprotective activity against PCM – induced hepatotoxicity in rats. This plant is used in traditional system medicine in the treatment of jaundice; no systematic studies on their hepatoprotective activity have been reported before.
The hepatotoxicity produced by administration of PCM at a dose of 2gm/kg for 7 days, was found to be inhibited by simultaneous oral ethanolic extracts of Eclipta alba leaves at a dose 250 and 500 mg/kg for 7 days, with evidence of decreased level of serum aspartate amino transferase (AST/SGOT), alanine amino transferase (ALT/SGPT), bilirubin, cholesterol and increased total protein. the administration of extracts with PCM for 7 days masked the liver fatty changes induced by the hepatotoxic compound observed in the control rats and comparable with the hepatoprotective effect of the standard drug silymarin. The ethanolic extracts of Ecliptaalba leaves in two doses, did not affect either the elevated level of the hepatic enzymes induced by PCM or protectively from liver. Furthermore, the subchronic toxicological investigations were done to evaluate the adverse toxic signs and effects of the plant that possess hepatoprotective activity. A preliminary phytochemical screening of the powdered plants was also carried out.
**Keywords:**Drug Profile,Phytoconstituents, Jaundice, Hepatoprotactive activity

## I. INTRODUCTION

The liver is the key organ regulating homeostasis in the body. It is involved with almost all the biochemical pathways related to growth, fight against disease, nutrient supply, energy provision and reproduction [1]. An estimated 70% of population around the world use traditional medicines derived from plant species for their treatment and cure [2]. Many plant products have been reported to protect against hepatic injury [3]. The liver is expected not only to perform physiological functions but also to protect against the hazards of harmful drugs and chemicals. Inspite of tremendous scientific advancement in the field of hepatology in recent years, liver problems are on the rise. Jaundice and hepatitis are two major hepatic disorders that account for a high death rate [4]. Presently only a few hepatoprotective drugs and that too from natural sources (there is not a single effective allopathic medication), are available for the treatment of liver disorders.

Ecliptaalba (L.) Hassk.(syn.Ecliptaprostratal.), commonly known as false daisy.yerba de tago, and bhringraj, is a plant belonging to the family Asteraceae. Root well developed cylinderical, greyish. Floral heads 6-8mm in diameter, solitary, white, achene compressed and narrowly winged. In ayurvedic medicine, the leaf extract is considered a powerful liver tonic. The herb Eclipta alba contains mainly coumestansie.,Wedelolactone(I) and demethylwedelolactone(II), Polypeptides, Polyacetylenes, thiophene derivatives, steroids, triterpenes and flavanoids. Coumestans are known to possess estrogenic activity [5]. Wedelolactone possesses a wide range of biological activities and is used for the treatment of hepatitis and cirrhosis [6], as an antibacterial, anti-hemorrhagic [7] and for direct inhibition of IKK complex resulting in suppression of LPS-induced caspase-II expression [8].

Ecliptaalba (L) Hassk. (Syn. E prostata. L., AsteraceaeBhringaraja) is a highly reputed plant in the Ayurvedic system of medicine for the treatment of liver ailments [9-10] we have previously reported significant in vivo hepatoprotective activity of ethanolic extract from fresh leaves of Eclipta alba against carbon tetrachloride (CCl4) induced liver injury [11-12].

Chemically, presence of a number constituents has been reported in this plant [13-15]. Coumestanwedelolactone and desmethylwedelolactone have been identified as active components responsible for antihepatotoxic

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

activity on the basis of in vitro studies on primary cultured rat hepatocytes against CCI4, galactosamine and phalloidin induced cytotoxicity [17-19]. These active components have also shown protection against phalloidin toxicity in vivo where the survival rate was considered the sole criterion of protection [17-19]. However, these findings are not supported by effect on various makers of hepatoprotective activity in vivo. Further, the effect of other constituents present in E. alba leaf extract has also not been reported.

We have fractionated the alcoholic extract from E. alba leave (Ea) into three parts (EaI, Eall and EaIll) and of them were chemically analysed and pharmacologically evaluated to identify the biologically active fraction. From this; ecliptal, wedelolactone[20-21], desmethylwedelolactone [22-24] and its 7-O-glucoside, ß- amyrin [25] were isolated. Polypeptides isolated from whole plant gave five amino acids on hydrolysis viz.; cystine, glutamic acid, phenylalanine, tyrosine and metionine (leaves/aerial parts) [26]. A new dithienyl acetylene ester isolated from roots and characterized as 5'-isovaleryloxymethylene-2-(4-isovaleryloxybut-3-ynl) dithiophene [27], 5'-tigloyloxymethylene-2-(4-isovaleryloxybut-3-ynyl) ditiophene (III) isolated from aerial parts and roots. It gives glycosides along with eclalbasaponins [28].

The plant exhibits anti-inflammatory activity [29]. Wedelolactone and desmethylwedelolactone possesses potent antihepatotoxic property [30-31]. Alcoholic extract of the herb has antiviral activity against Ranikhet disease. The leaves alone or in combination with ajowan seeds are used in diseases of gall bladder. Plant juice cures skin infections. Bhringraj oil obtained from the plant is applied to scalp before bed time in insomnia. E. alba is reported to be effective in the treatment of peptic ulcers. Immunoactive property has also been observed against surface antigen of hepatitis B- virus [32-36]. The fresh plant is used as a tonic and deobstruent in enlargement of the liver and spleen [37]. The plant yields black dye and is used as dyeing agent in textile industries of Assam [38]. The leaf juice boiled with sesamum or coconut oil is used for anointing the head to render the hair black .The root is emetic and purgative [39-40]. It is widely used to improve colour and luster of the hair [41]. It is a constituent of an Ayurvedic formulation 'Geriforte' which is used in senile pruritus and as antistress.

**1.2 Drug Profile**

Bhrungaraj is well known drug for hair disorders from the very ancient time. It is described by Bhavaprakash, Raj Nighantu, Bheshajjyaratnavali and many ayurvedic texts. It is known by its synonyms like Kesharaj, Kesharanjana, Markava , etc.

The genus name comes from the Greek word meaning "Deficient," with reference to the absence of the bristles and awns on the fruits. The specific Ecliptaalba means white which refers to the color of the flowers [60].

The herb is being used for its curative properties as antimytotoxic, analgesic, antibacterial, antihepatotoxic, antihaemorrhagic, antihyperglycemic, antioxidant, and for immunomodulatory properties and it is considered as a good rejuvenator. It is an active ingredient of many herbal formulations used for liver disorders and enhances liver cell generation. It is used for its tonic and diuretic action in hepatic and spleen [61] enlargement.

It is also useful in Krumi (worm infestation), Shotha (oedema), Pandu (anemia), etc. also useful for wound healing and skin diseases. Several formulations are prepared from this drug like Bhrungaraj Tail, BhrungarajSwaras, etc which are popularly used for hair treatment in hair disorders also. Still there is a large market trade of oils & medicaments prepared from Bhrungaraj. Various chemical constituents [62] are separated from Bhrungaraj& are being clinically tested for various hepatic disorders, etc.

**1.2.1 BOTANICAL DESCRIPTION [63]**

Ecliptaalba (L.) Hassk.(Syn. Ecliptaprostrata L.)is commonly known as False Daisy, yerba de tago, and bhringraj, a plant belonging to the family Asteraceae. Root is well developed, cylindrical, greyish in color. It is also named 'kehraj' in Assamese and karisalankanni in Tamil. Floral heads are 6-8 mm in diameter, solitary, white, achene compressed and narrowly winged.

Ecliptaalba is a herbaceous tufted plant that may be prostrate or grow up to 50cm in erect form. The stems and leaves are covered with white hairs. Sometimes the stems may be reddish.

The leaves are simple, opposite and attached to the stem without petiole. The inflorescences are white on a hemispherical heads of 1cm in diameter. The figures of Eclipta entire plant and its different parts are shown in Figures.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781


Fig.1 Whole Plant of E. alba Fig.2 Flower of E.alba

**1.2.2 BOTANICAL CLASSIFICATION [64]**

| | | |
|---|---|---|
| Kingdom | : | Plantae |
| Unranked | : | Angiosperms |
| Unranked | : | Eudicots |
| Unranked | : | Asterids |
| Order | : | Asterales |
| Family | : | Asteraceae |
| Genus | : | Eclipta |
| Species | : | Ecliptaalba |
| Botanical name | : | Ecliptaalba L. Hassk |
| Synonyms | : | Ecliptaerecta, Eclipta prostate, Verbesinaalba |

**PHYTOCONSTITUENTS**

Eclipta alba (L) has wide variety of active constituents as described in Table no 1, The constituents are coumestan derivatives like wedololactone[1.6%], and alkaloidal principles like ecliptine, glyoide like demethylwedelolactone, desmethyl-wedelolactone-7 glucoside present in leaves and other constituents are ecliptal, ß-amyrin, luteolin-7-O-glucoside in aerial parts, hentriacontanol, heptacosano in roots, stigmasterol. All the parts of Ecliptaalba and chemical constituents are used as anticancer, antileprotic, analgesic, antioxidant, antimyotoxic, antihaemorrhagic, antihepatotoxic, antiviral, antibacterial, spasmogenic, hypotensive, ovicidal, promoter for blackening and growth of hair. [67]

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

**Chemical constituents and biological activities of parts of Ecliptaalba**

| Sr no. | Part | Formulation | Constituents | Biological Activity |
|---|---|---|---|---|
| 1. | Leaves | Juice | Stigmasterol,a-terthienymethanol, Wedelolactone[1.6%], Desmethylwedelolactone, Desmethyl-wedelolactone-7-glucoside | Skin diseases, allergic Urticaria, Asthma, Inflatulence, Colic and liver affections, Bronchitis, Enlarged glands, Dizziness, Vertigo, Blurred vision |
| 2. | Roots | Powder/ juice | Hentriacontanol, Heptacosanol& Stigmasterol4, Ecliptal12-1 | Liver tonic, Emetic, Purgative, Antiseptic to ulcers, Wounds in cattle |
| 3. | Aerial parts | Juice | ß-amyrin & Luteolin-7-0-glucoside, Apigenin, Cinnaroside, Sulphur compounds | |
| 4. | Stems | Paste | Wedelolactone | |
| 5. | Seeds | | Sterols | Sexual debility, Tonic, Aphrodisiac |
| 6. | Twigs of the plant | Paste | Unnamed alkaloid | |
| 7. | Whole plant | Paste | Large amounts of resin, Ecliptine, Reducing sugar, Nicotine, Stigmastero, Triterpene saponin, Eclalbatin togetherwith a -amyrin, Ursolic acid, Oleanolic acid. | Rejuvenating, Age-sustaining tonic, Detoxifying, Deobstruent, Antiseptic herb in vitiated blood, Anaemia, Splenic and liver enlargements, Catarrhal jaundice, Hyperacidity, Gastritis, Dysentery, Anticatarrhal, Spasmogenic, Hypotensive properties |

**Traditional Uses**

Shotha, Vrana, Savarnikarana, KeshaVyadhis, Shleepada, granthi, Shirashula, Greying of hair, etc. It is also used as application in Hepatic & Splenic enlargements & in various chronic skin diseases. It is also useful internally in Yakrutvyadhis, Yakrutvruddhi, Spleenic enlargements, jaundice, Udarashula, etc. In Krumi with Castor oil, Shwasa, Kasa& in Mutradaha. Useful in Serpent bite, scorpion bite, chronic glandular swellings & other skin diseases & Alopecia, etc. Leaf juice is used as hepatic tonic.The crude extract shows wound healing property and it counteracts CCl4-induced inhibition of the hepatic microsomal drug metabolizing enzymes. The restoration of loss of hepatic lysosomal acid phosphatase and alkaline phosphatase by CCl4 was significantly seen by using Ecliptaalba showing the hepatoprotective activity of Eclipta alba which is by regulating the levels of hepatic microsomal drug metabolizing enzymes. The fresh plant is used as a helpful medication by AIDS patients in part showed potential as a therapeutic agent against Giardia intestinalis infections also. It shows antimicrobial and antioxidant properties and is being used in pilex formulation along with other ingredients reported to decrease the bleeding time of the patient. Leaf extract is being used in oedema. It is used in the treatment of paronychia.

**Jaundice**

Jaundice refers to the staining of tissue with bilirubin or bilirubin complexes. It is detectable when the plasma bilirubin exceeds 50m mol/L (3 mg/dl) [44]. The staining is much more pronounced with conjugated bilirubin (direct), than with unconjugated bilirubin. [43]

The usual divisions of jaundice are:

**1-Haemolytic jaundice**

The increased breakdown of red cells leads to an increase in production of bilirubin.

**2-Hepatocellular jaundice**

Hepatocellular jaundice results from inability of the liver to transport bilirubin into the bile as a result of liver cell damage.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

**3-Cholestatic jaundice**

Cholestasis is a failure of bile flow. This can be divided into extrahepatic and intrahepatic cholestasis.

## II. MATERIAL AND METHOD

**1. Animals**

Experiments were carried out on Wistar rats. The animals were housed in polypropylene cages. Paddy husk was provided as bedding material, which was changed every day. They were fed with standard pellet diet and purified water. They were kept in a well-aerated room and a 12-hour light and dark cycle was maintained. The room temperaturewas maintained at 25 ± 20C.

**2. Instruments and chemicals**

Soxhlet apparatus,Distillation apparatus,Freeze drier,Heating mental,Electronic Balance,Electric grinder,Oral cannulationsyring,Capillary tubes,Ependroff tubes,Centrifuge,Auto analyser, Paracetamol, Silymarin, Ethanol 95%.

**Method**

In this class all experiments were divided into two main parts, the first part concerned with plants and the second part dealt with animals.

**Preparation of plant materials**

The fresh leaves of Ecliptaalba were collected. Then the leaves were thoroughly washed with water. Freshly collected leaves were shade dried and coarsely powdered in a grinder.

**Plants Extraction method**

The powder material was soaked in 95% ethanol for four days in soxhlet apparatus. The ethanolic extract was concentrated to dry residue by distillation. it was labeled and store in the desiccators for further usage.

**Design of the experiment**

Rats were divided into 5 groups of 6 animals each.

GROUPS TREATMENT
Group I Distilled water
Group II PCM (2g/kg po)
Group III silymarin (100mg/kg po) &Paracetamol (2g/kg po)
Group IV Paracetamol (2g/kg po) &Ecliptaalba extract (250mg/kg po)
Group V Paracetamol (2g/kg po) &Ecliptaalba extract (500mg/kg po)

Group I
It was maintained as control, which will be treated with distilled water only.
Group II
It was Receive Paracetamol (2g/kg po) single dose for seven days.
Group III
It was receive silymarin (100mg/kg po) orally and Paracetamol (2g/kg po) simultaneously for seven days.
Group IV
It was receiveParacetamol (2g/kg po) single dose and Eclipta alba extract (250mg/kg po) simultaneously for seven days.
Group V
It was receiveParacetamol (2g/kg po) single dose and Eclipta alba extract (500mg/kg po) simultaneously for seven days.

Administration of Herbal Plant (Eclipta Alba)

The above powdery extract of Ecliptaalba leaves (EA) was suspended in water without adding any suspending agent for oral administration.

**Blood Samples**

Blood was obtained by puncturing retroorbital plexus (Poole, 1989), under anesthesia (diethyl ether) using capillary tubes. Blood drops were collected, gently, serum was separated by centrifugation (2500 rpm for 15min). Samples were collected after dosing with the tested plants extracts at 9 day.

**Biochemical parameters**

The rats were kept overnight fasting after 10days and blood samples were collected by retro orbital puncture under ether anaesthesia and the serum was used for the estimation of hepatic biochemical markers like .alanine amino transeferase (ALT/SGPT), aspartate amino transferase (AST/SGOT), total bilirubin (TBIL), TP, and Cholestrol level using standard kits. The enzyme levels were estimated and the results were expressed as U/l.

**Determination of Aspartate amino Transferase (AST/SGOT)**

In different marked test tubes as Blank and Test, Pipetted 100 µl working reagent in both the tubes and10µl Serum to the tube marked as test. Mixed well, incubated for 5 minutes at 37 ºC and read the decrease in absorbance at 340 nm against Reagent blank for 180 seconds at an interval of 30 seconds using semi auto analyzer by kinetic method. The Units are expressed as IU/L. The result was calculated by the following formula-

**AST activity [IU/L] = Δ Absorbance / min. × Factor .**

**Alanine Amino Transeferase (ALT/SGPT)**

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

In different tubes Pipetted 1000 µl of working reagent into marked test tubes as Blank and Test and to this added 100 µl working reagent and Serum respectively. Mix well, incubated for 5 minutes at 37 ºC and read the absorbance at 340 nm. A decrease in the absorbance against Reagent blank was measured for 180 seconds at an interval of 30 seconds using semi auto analyzer by kinetic method. The Units were expressed as IU/L and the result was calculated by the following formula-

**ALT activity [IU/L] = Δ A / min × Factor**

**Total Bilirubin**

In different tubes, Pipetted 500 µl of working reagent into marked test tubes as Blank, Standard and Test and to this add 25 µl distilled water,calibrator and Serum respectively. Mix well, incubated for 5 minutes at 37 º C for Total Bilirubin . Read absorbance at 546 nm against reagent blank using autoanalyzer. The units are expressed as mg/dl. was calculated by the following formula-

**Absorbance tube Total × 17.5 = Total Bilirubin (mg/dl).**

**CHOLESTEROL**

| **Pipette into tubes marked** | **Blank** | **Standard** | **Test** |
|---|---|---|---|
| **Serum/Plasma** | - | - | **10µL** |
| **Reagent 2** | - | **10µL** | - |
| **Reagent 1** | **1000µL** | **1000µL** | **1000µL** |

Mix well incubate at 370C for 10 minutes or at room temperature (+150C to + 300C) for 30 minutes. Programme the analyser as per assay parameters.

1. Blank the analyser with Reagent Blank.
2. Measure absorbance of Standard followed by the Test.
3. Calculate results as per given calculation formula.

$$\text{Total cholesterol concentration (mg/dL)} = \frac{\text{Absorbance of Test}}{\text{Absorbance of Standard}} \text{x } 200$$

**Total Protien**

$$\text{Total Protein concentration (g/dL)} = \frac{\text{Absorbance of Test}}{\text{Absorbance of Standard}} \text{x } 6.5$$

**Conversion Factor**

$$\text{Total Protein concentration } \left(\frac{\text{g}}{\text{L}}\right) = \text{totalprotein concentration in} \frac{\text{g}}{\text{dl}} \text{x } 10$$

**Statistical Analysis**

The data are expressed as mean ± SEM (n=6). Statistical significance was determined by one way ANOVA. p values less than 0.05 were considered significant.

**Histopathological Studies In Liver**

After the required amount of liver tissues were utilised for homogenate preparation, the remaining liver tissues were washed with normal saline and fixed in 10% formalin and examined using light microscopy (x100 magnification).

## III. RESULT

The rats of all the two groups treated with alcoholic extract of Eclipta alba at different dose levels showed significant reduction in SGOT, SGPT, Total bilirubin, Cholesterol and inceased in serum Protien level compared to the PCM treated group. The results obtained so are statistically significant and comparable to the silymarin treated group as shown in the table-

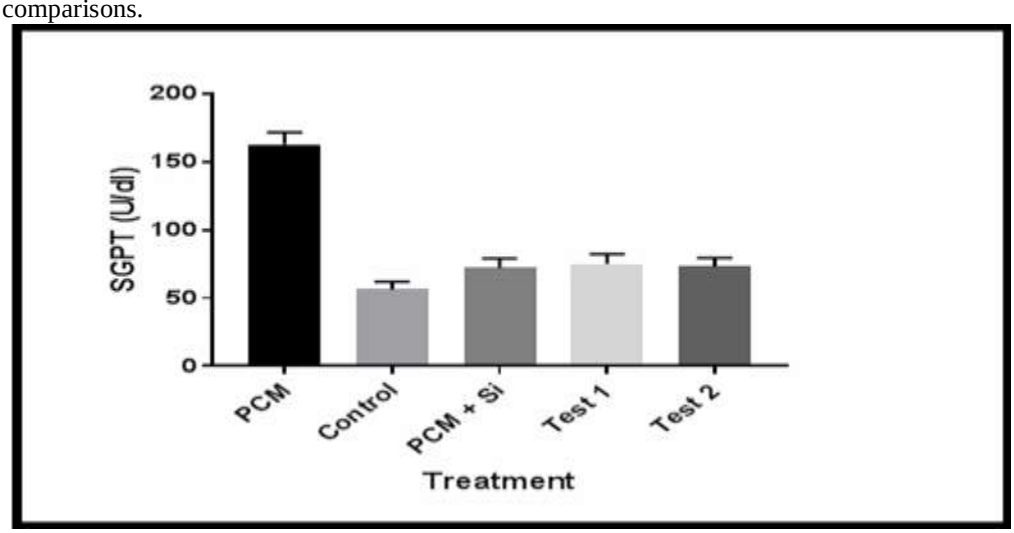
**Effect of ethanolic extract of Ecliptaalba Linn. On SGOT on PCM induced hepatotoxicity in rats:**

| Groups | Treatment | SGPT(IU/dl) |
|---|---|---|
| **Control** | Distilled water | 56.49±3.508**** |
| **Negative control** | PCM (2gm/kg) | 162.60±9.60 |
| **Standard** | Silymarin (100mg/kg) + PCM (2gm/kg) | 72.16±4.799**** |
| **Test 1** | Ethanolic extract of Eclipta alba (250mg/kg) + PCM (2gm/kg) | 75.14±5.23**** |
| **Test 2** | Ethanolic extract of Eclipta alba (500mg/kg) + PCM (2gm/kg) | 73.03±4.617**** |

All values are represents mean ± SEM; n= 6 animals.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

Note: P < 0.05 as compared to PCM treated group. One-way ANOVA followed by Graph Pad Prism 7 test for multiple comparisons.

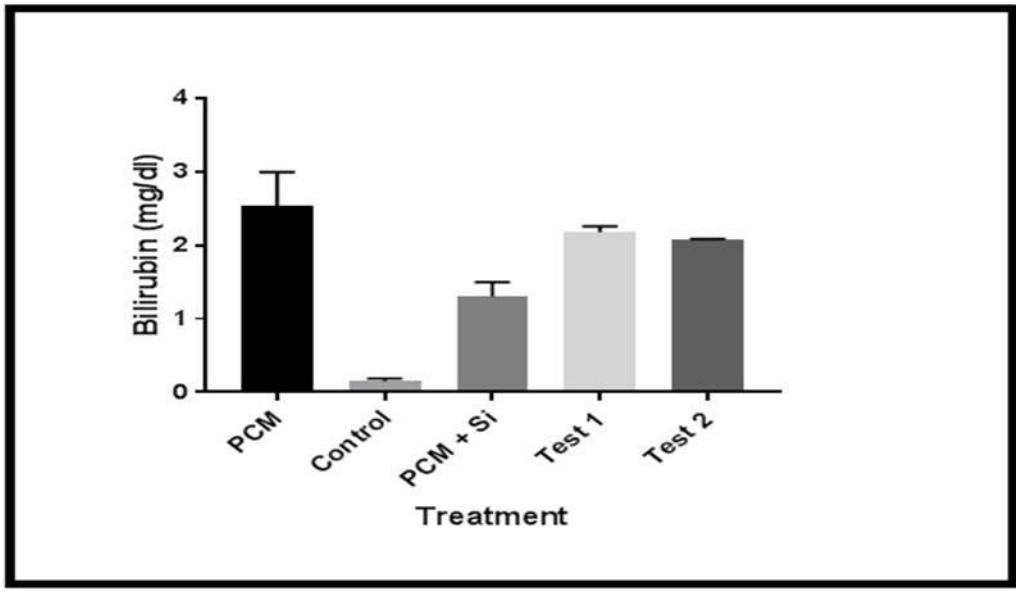



**Effect of ethanolic extract of Ecliptaalba Linn. On Bilirubin on PCM induced hepatotoxicity in rats**:

Note: P < 0.05 as compared to PCM treated group. One-way ANOVA followed by Graph Pad Prism 7 test for multiple comparisons.

| Groups | Treatment | Bilirubin (mg/dl) |
|---|---|---|
| **Control** | Distilled water | 0.15±0.180*** |
| **Negative control** | PCM (2gm/kg) | 2.53±0.830 |
| **Standard** | Silymarin (100mg/kg) + PCM (2gm/kg) | 1.30±0.210** |
| **Test 1** | Ethanolic extract of Eclipta alba (250mg/kg) + PCM (2gm/kg) | 2.18±0.177 |
| **Test 2** | Ethanolic extract of Eclipta alba (500mg/kg) + PCM (2gm/kg) | 2.07±0.186 |

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

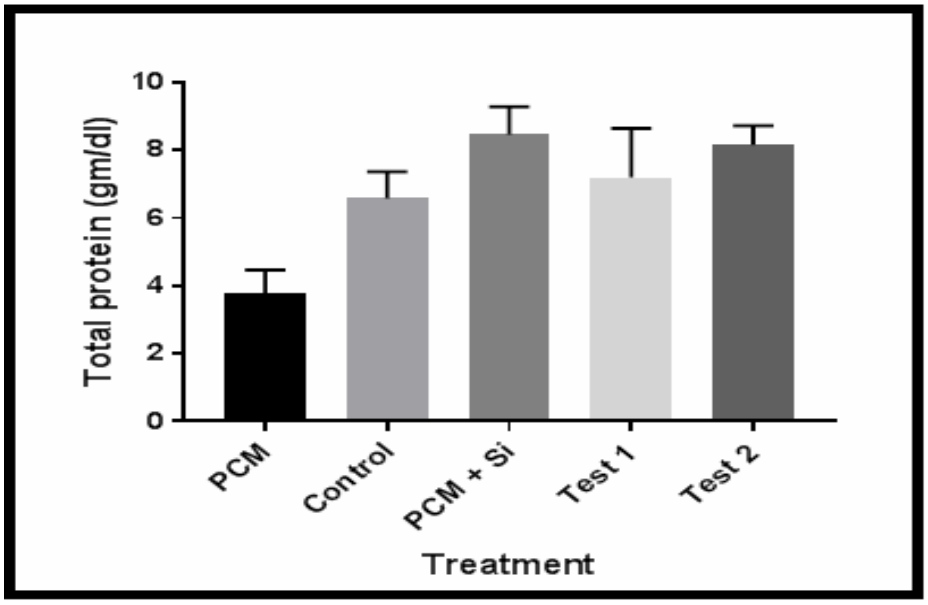



**Effect of ethanolic extract of Ecliptaalba Linn. On Serum Protien on PCM induced hepatotoxicity in rats:**

| Groups | Treatment | Total Protien(mg/dl) |
|---|---|---|
| **Control** | Distilled water | 6.58±.507** |
| **Negative control** | PCM (2gm/kg) | 3.79±1.29 |
| **Standard** | Silymarin (100mg/kg) + PCM (2gm/kg) | 8.46±.559** |
| **Test 1** | Ethanolic extract of Eclipta alba (250mg/kg) + PCM (2gm/kg) | 7.20±0.348*** |
| **Test 2** | Ethanolic extract of Eclipta alba (500mg/kg) + PCM (2gm/kg) | 8.16±0.208**** |

**Note**: $P < 0.05$ as compared to PCM treated group. One-way ANOVA followed by Graph Pad Prism 7 test for multiple comparisons.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

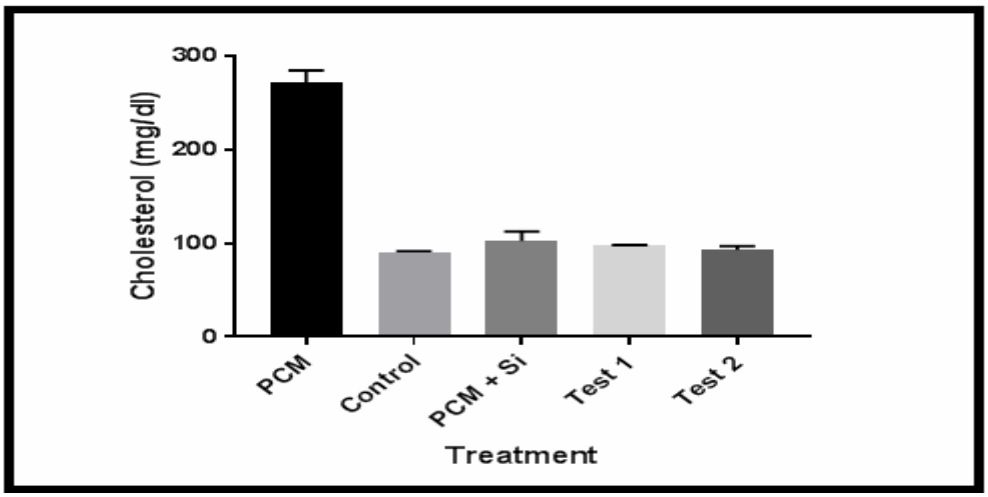



**Effect of ethanolic extract of Ecliptaalba Linn. On Serum Cholesterol on PCM induced hepatotoxicity in rats:**

| Groups | Treatment | Serum Cholesterol(mg/dl) |
|---|---|---|
| **Control** | Distilled water | 90.37±4.80**** |
| **Negative control** | PCM (2gm/kg) | 271.63±11.93 |
| **Standard** | Silymarin (100mg/kg) + PCM (2gm/kg) | 102.3±18.758**** |
| **Test 1** | Ethanolic extract of Eclipta alba (250mg/kg) + PCM (2gm/kg) | 97.23±5.155**** |
| **Test 2** | Ethanolic extract of Eclipta alba (500mg/kg) + PCM (2gm/kg) | 93.11±6.279**** |

**Note**: $P < 0.05$ as compared to PCM treated group. One-way ANOVA followed by Graph Pad Prism 7 test for multiple comparisons.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781




Histopathology:-

**Histopathological studies showed that-**

- Control rats showed the normal appearance of liver without any histological alterations (Fig. 1).
- Paracetamol administered rat caused pathological changesin liver including severe congestions, hydropic degeneration and occasional necrosis (Fig. 2).
- Administration of Ecliptaalba decreased the hepatocyte damage induced by paracetamol (PCM) and silymarin change in severe congestion, hydropic degeneration and occasional necrosis of rats (Fig. 3).
- The liver was almost has normal appearance with mild change in severe congestion, hydropic degeneration and occasional necrosis of rats treated with Eclipta alba and PCM (Fig. 4 & 5)

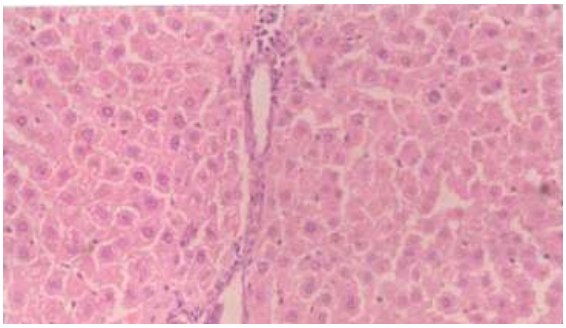


**Fig.14.1: Rat liver control x100**

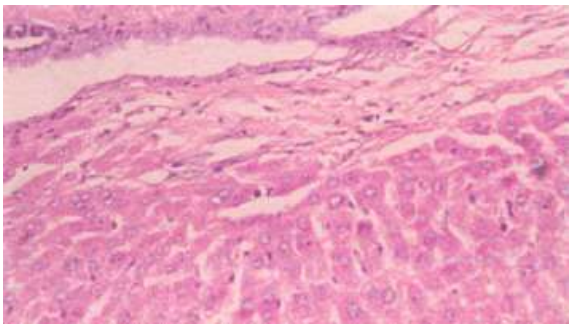


**Fig. 14.2: Rat liver PCM treated x100**

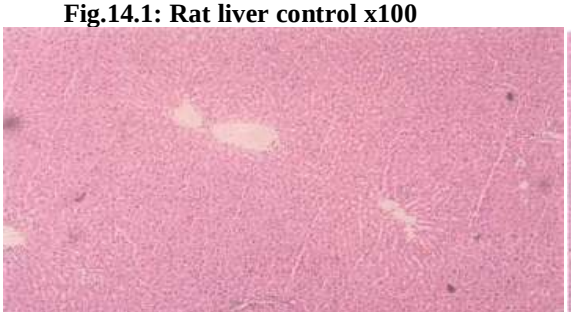


**Fig.14.3: Rat liver PCM + silymarin treaded x100**

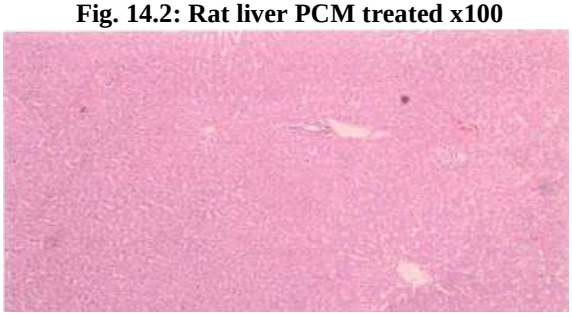


**Fig.-14.4: Rat liver PCM + E.alba x100**

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

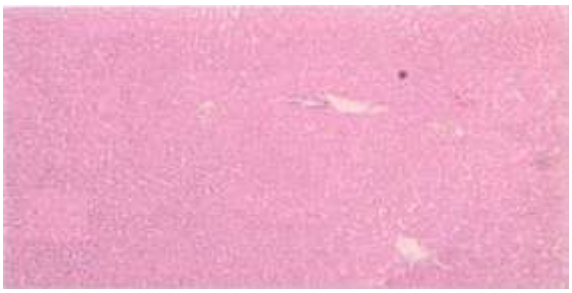


**Fig.-14.5: Rat liver PCM + E.alba x100 (500mg/kg)**

## IV. DISCUSSION

Decreased SGOT level to ($p<0.05$) compare to PCM treated group. Serum enzyme SGPT levels were increased significantly in PCM treated group as compared to the control group. The values were increased up to ($p<0.05$), compared to control group, which was the serum SGPT were decreased significantly in test group up to ($p<0.05$)at doses of 250 and 500 mg/kg body wt. respectively as compared to the only PCM treated group. Silymarin also have decreased the serum SGPT level to ($p<0.05$). Total serum Bilirubin levels in PCM treated group have significantly increased compared to control group. The values were increased upto ($p<0.05$), compared to control group. The serum total bilirubin values were reduced significantly in test group upto ($p<0.05$) at doses of 250 and 500 mg/kg body wt. respectively as compared to the only PCM treated group. Silymarin also have reduced serum total bilirubin level to ($p<0.05$).Serum Protien levels in PCM treated group have significantly decreased compared to control group. The values were deceased upto ($p<0.05$), compared to control group. The serum total bilirubin values were increased significantly in test group upto ($p<0.05$) at doses of 250 and 500 mg/kg body wt. respectively as compared to the only PCM treated group. Silymarin also have increased serum protien level to ($p<0.05$).

Total serum Cholesterol levels in PCM treated group have significantly increased compared to control group. The values were increased upto ($p<0.05$), compared to control group. The serum cholesterol values were reduced significantly in test group upto ($p<0.05$) at doses of 250 and 500 mg/kg body wt. respectively as compared to the only PCM treated group. Silymarin also have reduced serum Cholesterol level to ($p<0.05$).

Assessment of liver function can be performed by determining the activity of serum enzymes SGPT, SGOT originally present in high concentrations in the cytoplasm. When there is hepatic injury, these enzymes leak into the blood stream in conformity with the extent of liver damage (Das SK et al., 2009). Where as the extracts treated animals had significantly reduced SGPT, SGOT levels indicating their hepatoprotective effect against PCM induced liver cell damage. The elevated activities of these marker enzymes in PCM treated rats in the present study were due to the extensive liver damage caused by the toxin. Treatment with the test drug as well as the reference drug silymarin significantly reduced the PCM induced elevation in the activities of these enzymes. The leakage of cell membrane participated in the accumulation of these enzymes into the plasma. Elevated activities of SGPT and SGOT enzymes indicate liver damage.

**Acknowledgements**

The auther is thankful to the authorities of department of pharmacy, M.J.P.R.U. Bareiily, Uttar Pradesh, India and family members for providing necessary facilities.

## REFERENCE

1. Ward, F.M., Daly, M.J. Hepatic disease, In: Walker, R., Edwards, C., editors, Clinical pharmacy and Therapeutics, Churchill Livingstone: Newyork, 1999; :195-212.
2. SK Sharma; N Goyal. Der Pharmacia Lettre, 2010; 2(5):308.
3. Zhen, M. C., Q. Wang, X. H. Huang, L. Q. Cao, X. L. Chen, K. Sun, Y. J. Liu, W. Li, and L. J. Zhang, J. Nutr. Biochem, 2007; 18: 795-805
4. Pangs, Xin, X., Stpierve, M.V. Ann.Rev.Pharmacol.Toxicol.,1992; 32:625-626.
5. Bickoff, E.M., Spencer, R.R., Witt, S.C. and Knuckles, B.E. Studies on the chemical and biological properties of coumestrol and related compounds. United States

Department of Agriculture, 1969 Technical Bulletin No. 1408.
6. Wagner, H., et al. 1986: 370.
7. Kosuge T. Yakugakuzasshi. ChronicaBotanica Indian Medicinal plants, 1985; 105, 791.
8. Kobori, H., Prieto-Carrasquero, M.C., Ozawa, Y. and Navar, L.G. hypotension, 2004; 43:1126-1132.
9. Kirtikar KR, Basu BD. Eclipta Linn In: Latter E, Caicus JF, Mhaskar KS eds. Indian Medicinal Plants. Lalit Mohan Basu, Allahabad, India.2nd ed. (Reprint).1987; 2: 1360-1365.
10. Dixit SP, Achar MP. Study of Bhringaraja (Ecliptaalba) therapy in jaundice in children. Jour Sci Res PI Med 1981; 2: 96-100.
11. Singh B, Saxena AK, Chandan BK, Agarwal SG, Bhatia MS, Anand KK. Hepapatoprotective effect of ethanolic extract of Ecliptaalba on experimental liver damage. Phytother Res 1993; 7: 154-158.
12. Saxena AK, Singh, Anand KK, Hepapatoprotective effect of Ecliptaalba on subcellular levels in rats. J Ethnopharmacol 1993; 40: 155-16l.
13. Govindachari TR, Nagarajan K, Pai BR. WedelolactoneEcliptaalba. SciInd Res 1965; 15B:664-665.
14. Krishnaswamy NR, Seshadri TR, Sharma BR. The structure of a new polythienyl from Ecliptaalba. Tetrahedron Lett.1966; 35: 4227-4230.
15. Bhargava KK, Krishnaswamy Nr, Seshadri TR. Isolation of desmethylwedelolactone and its glucoside from Eclipta alba. Indian J Chem. 1970; 8: 664-665.
16. Wagner H, Geyer B, Kiso Y, Hikino H, GS. Coumestans as the main active principles of the liver drugs Ecliptaalba and Wedeliacalendulacea. Planta Med 1986; 52: 370-374.
17. Wong SM, Antus S, Gottsegen A, Fessler B, RaoGs, Son ncnbichler J, wagner H. Wedelolactone and coumestan derivatives as new antihepatotoxic and antiphlogistic principles. ArzneimForsch / drug Res 1988; 38: 661-665.
18. De S, B Ravishankar, Bhavsar GC Plants with Hepatoprotective Activity, Indian Drugs, 1993; 30(8):355-363.
19. Kothari A, Shrivastava N. Antimicrobial activity of Eclipta alba, Indian Drugs, 2005, 42(3):133-135.
20. Das M, Patel KN, Shah BK, Chauhan MG, Bhavsar GC, Antihepatotoxic Principles in Tissue Culture of E. alba Linn., Indian Drugs, 1991; 28(8):356-358.
21. Das N, Bhavsar GC, Chauhan MG., Spectrophotometric Determination of Hepatoprotective Principles of Eclipta alba, Indian Drugs, 1990; 28(2):100-102.
22. Bhargava KK, Krishnaswamy NR, Seshadri TR., Isolation of Desmethylwedelolactone and its Glucoside from Eclipta alba., Indian J. Chem., 1970; 8: 664-665.
23. Rastogi RP, Mehrotra BN., Compendium of Indian Medicinal Plants, Central Drug Research Institute Lucknow, National Institute of Science Communication New Delhi; 1980; 3: 260.
24. Choudhri GN, Joseph Z., Intraspecific diffrerentiation in EcliptaalbaHassk; on the shift in equilibrium of aminoacid Accumulation, Science and culture, 1986; 52(4): 127-129.
25. Rastogi RP, Mehrotra BN., Compendium of Indian Medicinal Plants, Central Drug Research Institute Lucknow, National Institute of Science Communication New Delhi, 1985; 4: 280-281.
26. Yahara S, Ding N, Nohora T, Masuda K, Ageta H., Taraxastane glycosides from Eclipta alba, Phytochemistry, 1997; 44(1): 131-135.
27. Anonymus, The Wealth of India: A Dictionary of Indian Raw Materials and Industrial Products', First Supplement Series (Raw Materials), National Institute of Science Communication, Council of Science and Industrial Research New Delhi; 2002; 3: D-I: 47-48.
28. Bhattacharya SK, Satyan KS, Chakrabarti A., Effect of Trasina: an ayuvedic herbal formulation, on pancreatic islet superoxide dismutase activity in hyperglycaemic rats, Indian J. Exp. Bio 1997; 35: 297-299.
29. Chatterjee S, Das SN, Uptake of Bromsulphalein by liver slices of rats treated with carbon tetrachloride (CCl4) and a herbal formulation, Indian Drugs, 1999; (2):140-141.
30. Franca SC, Bertoni BW, Pereira AMS, Antihepatotoxic agent in micrpropagation plantlets of E.alba Plant cell, Tissue and organ culture, 1995; 40: 297-299.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 5 Sep-Oct 2021, pp: 468-481 www.ijprajournal.com ISSN: 2249-7781

31. Doreswamy R. and Sharma D., Plant Drugs for Liver Disorders Management, Indian Drugs, 1995; 32(4):139-154.
32. Jayathirtha MG, Mishra SH., Preliminary immunomodulatory activities of methanol extracts of Eclipta alba and Centellaasiatica, Phytomedicine, 2004;11: 361-365.
33. Gupta R., EcliptaalbaHassk.-An Important Medicinal Plant (Uses and Phytochemistry), BMEBR, 1983; 7(1-2); 89-94.
34. Kar A, Borthakur SK., Dye yielding plants of Assam for Dyeing Handloom Textile Products, Indian J TradKnowldg, 2008; 7 (1): 166-171.
35. Chandra K., Traditional remedies of Baharaich and Gonda District of U.P., Sachitra Ayurveda, Patna, 1985; 483-485.
36. Maheshwar JK, Singh KK, Saha S., Ethnomedicinal uses if plants by the Tharus of Kheri District, U.P.,Bull. Medico- Ethno. Bot. Res 1980; 1: 318-337.
37. Rastogi RP, Mehrotra BN., Compendium of Indian Medicinal Plants.Central Drug Research Institute Lucknow and National Institute of Science Communication New Delhi 1970; 2: 289.
38. Kirtikar KR, Basy BD, Indian Medicinal plants. B.Singh and M.P. Singh publications, Dehradun, 1991; 2: 1445-1449.
39. Khandeparkar UK, Kulkarni RD., Antifatigue effect of Indigenous drug 'Geriforte' in rats, Indian Drugs 1981;4: 346-349.
40. Thakur VD, Mengi SA, Neuropharmacological profile of Ecliptaalba (Linn.) Hassk., J. Ethno. Pharmacol, 2005; 102: 23-31.
41. Silverstein RM, Webster FX, Spectrometric Identification of Organic Compounds, sixth edition, John Wiley and Sons Inc., New York, 2004; 42-44.
42. Cornelius, C. E.). Animal Models in Liver Research. In Anwer, M. S., Transhepatic Solute Transport and Bile Formation,. Academic Press, Inc. London;1993:1-29
43. Radostitis, O. M., Gay, C. C., Blood, D. C. and Hinchcliff, K. W. Diseases of the liver and pancreas. Veterinary Medicine, Harcourt Publishers Limited, London, 9th ed., 2000:23-25
44. Finlayson, N. D. C., Hayes, P. C. and Simpson, K. J. Diseases of the liver and biliary system. DAVIDSON'S, Principles and Practice of Medicine, Churchill Livingstone, London, 18th ed.,1999:34
45. Clark, M. L. and Kumar, P. J. Liver biliary tract and pancreatic diseases. Clinical Medicine, Harcourt Publishers Limited, London, 4th ed., 2001.
46. Evans, W. C. An overview of drugs with antihepatotoxic and oral hypoglycaemic activities.Trease and Evans, Pharmacognocy, BaillièreTindall Publishers, London, 15th ed., 2002:224-226.
47. Handa, S. S., Anupam, S. and Chakrabort, K. K. (1986). Natural product and plants as liver protecting drugs.Fitoterapia, 57 ;( 5): 307-351.
48. Sera, A., Batalha, M. V., Diaw, M. M., Agba, K. C., Ba, A. C. and Gage, O.. Pharmacodynamic study of the hepatoprotective properties of Cochlospermumtinctorium A. Rich (Cochlospermaceae). Revue de Medicine Veterinaire, 1984;135 :( 4), 199-209.
49. Hoefler, C., Fleurentin, J., Mortier, F., Pelt, J. M. and Guillemain, J. Comparative Choleretic and hepatoprotective properties of young sprouts and total plant extracts of Rosmarinusofficinalis in rats. Journal of Ethnopharmacology,1987; 19 :( 2), 133-143.
50. Fleurentin, J., Hoefler, C., Lexa, A., Mortier, F. and Pelt, J. M. Hepatoprotective properties of Crepisrueppellii and Anisotestrisculus: two traditional plants of Yemen. Journal of Ethnopharmacology,1986;16 :( 1), 105-111.
51. Sharma, A. K., Anand, K. K., Pushpangadan, P., Chandan, B. K., Chopra, C. L., Prabhakar, Y. S. and Damodaran, N. P.. Hepatoprotective effects of WedeliaCalendulacea. Journal of Ethnopharmacology,1989; 25 :( 1), 93-102.
52. Chander, R., Kapoor, N. K. and Dhawan, B. N. Hepatoprotective activity of silymarin against hepatic damage in Mastomysnatalensis infected with Plasmodium berghei. Indian Journal of Medicine Research Section-B, Biomedical Research other than Infectious Diseases,1989; 90: 472- 477.
53. Paulova, J., Dvorak, M., Kolouch, F., Vanova, L. and Janeckova, L. Evaluation of the hepatoprotective and therapeutic effects of silymarin in liver damage experimentally produced with carbon tetrachloride in dogs.

Veterinary Medicine,1990; 35 :( 10), 629-635.
54. Visen, P. K. S., Shukla, B., Patnaik, G. K., Chandra, R., Singh, V., Kapoor, N. K., and Dhawan, B. N. Hepatoprotective activity of picroliv isolated from Picrorhizakurrooa against thioacetamide toxicity on rats hepatocytes. Phytotherapy Research, 1991; 5 :( 5), 224-227.
55. Chandan, B. K., Sharma, A. K. and Anand, K. K. (1991). Boerhaaviadiffusa: a study of its hepatoprotective activity. Journal of Ethropharmacology, 31 :( 3), 299-307.
56. Chattopadhyay, R. R., Sarkar, S. K., Gangyly, S., Banerjee, R. N., Basu, T. K. and Mukherjee, A. Hepatoprotective activity of Azadirachtaindica leaves on paracetamol induced damage in rats. Indian Journal of Experimental Biology, 1992.; 30 :( 8), 738-740.
57. Rao, P. G. M., Rao, S. G., Kumar, V., Ramnarayan, K., Nayak, S.S., Kamath, S. S. K. and Srinivasan, K. K.. Effects of Hepatogard against carbon tetrachloride induced liver damage in rats. Fitoterapia, 1993;64 :( 2), 108-113.
58. Lin, C. C., Lin, J. M., Chang, C. H., Hattori, M., and Namba, T. Pharmacological Studies on the crude drug 'Hwang –jin – guey' from Taiwan (1). Phytotherapy Research, 1994 ; 8 :( 4), 193-200.
59. Chunekar KC, Pandey GS , Guduchyadivarga, BhavprakashNighantu, ChaukhambaVishvabharatiPublication,Varanasi, , Shlokaa no. 240-241, 2002, 429
60. Pandeu M, Singh GN, Sharma R, Lata S, Antibacterial activity of Eclipta alba Hassk., Journal of applied pharmaceutical science, 2011; (01) 07:104-107
61. Mithun NM, Shashidhara S, VivekumarR ,Eclipta alba (L.) A Review on its Phytochemical and Pharmacological Profile, Pharmacologyonline, 2011, 1: 345-357
62. Wagner A, Geyer H, Kiso B, Hikino Y, &Rao GS, Coumestans as the main active principles of the liver drugs Eclipta alba and Wedeliacalendulacea, Planta Med. , Vol-52, 1986 : 370-374
63. Khare CP, Encyclopedia of Indian Medicinal plants, Springer-Verlag Berlin Heidelberg, New York, 2004, 198
64. Chopra RN, Nayar, SL, Chopra, IC, , Glossary of Indian Medicinal plants. C.S.I.R., New Delhi, 1955.
65. Chokotia L, Vashistha P, Sironiya R , Matoli H, Pharmacological Activities Of Eclipta alba (L.), International Journal Of Research And Development In Pharmacy And Life Sciences, Vol. 2, 2013: 499-502
66. Holm LG, Plucknett DL, Pancho JV, Herberger JP, The world's worst weeds, Distribution and Biology, East-West Center by the University Press. Hawaii. - Galinato M., Moody K., Piggin C. M.. Upland rice weeds of South and Southeast Asia. IRRI. Philippines; 1999
67. Daniel M, Medicinal plants chemistry and properties, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2006, 149
68. Abdul viqar khan, atharali khan, Ethnomedicinal uses of Eclipta prostrate. Indian journal of traditional knowledge, 2008; 7(2): 316-20