Eclipta Alba, A bunch of Pharmacological Possibilities- A Review

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Abstract

During literature survey of different plants, we came across a plant named Eclipta Alba, with too many different pharmacological actions, which keep motivated us to re-review the world of Eclipta Alba. In order to find some more aspects, this review has been summarized with too many works of different scientists across the world. During this task, we found that Eclipta alba has too many chemical constituents like Coumestans, Luteolins, Flavonoids and Glycosides which are responsible for their variety of pharmacological actions such as Immunomodulator, Antimicrobials, Anti-inflammatory, Analgesic, Anti-hyperglycemic, Anti-anaphylactic, Anthelmintic, Anti-viral, Ovicidal, Anti-hypertensive, Hepatoprotective, Anti-cancer, Antioxidant etc. It is also used as anti-venome.

Keywords: Eclipta alba; Chemical constituents; Pharmacological activity

Introduction

The commonly using herb i.e. Eclipta alba (Linn.) Hassk [Synonym-Eclipta prostrate (Linn.), (Family-Asteraceae)] is also said to be "Bhamgra" (Hindi), "Bhringarajah" (Sanskrit), "Kadiggagaraga" (Kannada). There are ten auspicious herbs in which Eclipta alba is one of the herb that constitute the group dasapuspam [1]. The herb is commonly moisture loving and creeping. Basically in India it is found on roadsides and waste lands [2]. Throughout India the plant is distributed in moist or wet wasteland that is ascending up to 2000mt on the hills [3]. The Leaves of Eclipta alba are sessile to sub-sessile, opposite, 1.2-2.3cm wide usually oblong, 2.2-8.5cm long, sub-acute or acute and lanceolate having apprised hair on both surfaces [4]. The plant has been used for the treatment of Kapha and Vata imbalances in Ayurveda, [5]. Eclipta alba, a herb contains mainly demethyl wedelolactone, coumestans, i.e.wedelolactone, polyacetylenes, polypeptides, triterpenes, steroids, flavonoids, luteolin, luteolin-7-O-glucoside, derivatives of thiophene, alkaloid ecliptine and the ubiquitous stigmasterol [6]. The anticancer, analgesic, antileprotic, antianaphylactic and antioxidant properties are found in all parts and chemical constituents of Eclipta alba [7]. Eclipta alba is also having the antihematotoxic, antimyotoxic, antibacterial, antiviral, hypotensive, ovicidal, spasmodenic activity and the plant is a promoter for growth and blackening of hair [8]. The aqueous extract of E.alba was evaluated to possess significant hypolipidaemic activity [9]. The leaves of E. alba are grounded and mixed with water and should be drunk for constipation [10]. The herb is supplied to the problems of gastritis and the respiratory disorders, like cough [11]. And there are the other various pharmacological activities that are possessed by E. alba, such as general tonic, memory disorders treatment, edema, rheumatic joint pains treatment and fevers, hepatitis, digestion, enlarged spleen, skin disorders and antioxidant activity. E. alba is used as an anti- septic for wounds in cattle and externally for ulcers in Gujrat and Punjab, and in rural areas the plant is reported to treat many microbial infections [12]. The paste of Eclipta alba is also beneficial to control eczema and disease of skin. The herb is effective in anemic condition and having antihypertensive action and in case of jaundice, mushroom toxins [13] and the administration of aerial parts of the herb is done.
Eclipta alba can serve as a potential memory modulator. Studies on rats that are primary responsible for the increment of is consist of luteolins, which are containing coumestans could insulate neuronal tissues from degeneration probably by preserving these areas from stress perturbations [18]. Protection of neuronal tissues may be possibly due to the immune modulatory actions of Eclipta alba, along with the non-specific immune system [26]. Their enhanced turnover of 5-HT can cause blunting of aggression [27]. Their profound free radical scavenging action could insulate neuronal tissues from degeneration probably by preserving these areas from stress perturbations [18].

Flavanoids

The leaf extract of Eclipta alba is consist of luteolins, which may be responsible for minimizing cognitive deficit because of cholinergic disfunctioning. The profound free radical scavenging action of Eclipta alba could insulate neuronal tissues from degeneration probably by preserving these areas from stress perturbations [18].

Glycosides

There were four new taraxatane triterpene glycosides, named ecalbasaponins 7-X were isolated from the dried whole plants of eclipta alba, along with ecalbasaponins 1-6. Volatiles oil. The volatile oils are the concentrated liquid and they are having Heptadecane, which is the one of the potent constituent, n-hexadecanoic acid, 6,10,14-trimethyl-2-pentadecanone, eudesma-4, 11-diene, pentadecane, phytoïl and octadec-9-enoic acid. The effects of the plant extract from the aerial parts of this plant on the proliferation of primary osteoblasts were measured by the MTT method and measuring the activity of alkaline phosphatase (ALP activity) [22].

Immunomodulator

One of our most complex biological systems in body is the immune system and the immunomodulatory agents originate from both plant and animal which directly increase the immune responsiveness of the body against pathogens by activating the non specific immune system [26]. Eclipta alba leaf extract contains luteolins, which may be responsible for minimizing cognitive deficit due to cholinergic disfunctioning [27]. Their profound free radical scavenging action could insulate neuronal tissues from degeneration probably by preserving these areas from stress perturbations. Protection of neuronal tissues may be possibly due to the immune modulatory actions of Eclipta Alba. And the Eclipta alba also responsible for the increment of phagocytic index and WBCs count are also significantly increased when test was done by using carbon clearance, antibody titer and phagocytic index and WBCs count are also significantly increased when test was done by using carbon clearance, antibody titer and cyclophosphamide induced immunosuppression [28]. Therefore, Eclipta alba can serve as a potential memory modulator. Eclipta alba has been found to activate Na⁺K⁺ATPase which produces an elevation in the intracellular concentration of Ca²⁺. Stimulation of the Ca²⁺ receptor induces the release of 5-hydroxytryptamine. The enhanced turnover of 5-HT can causeblunting of aggression and could be of plausible reason for the antiaggressive property.
is active against A. flavus and is used since was studied. Each extract was given orally. Carragenan induced paw oedema was performed. The first medium is solidified, and after that a well was made in the plates with the help of sterile borer (5mm). 0.2ml of compound, positive (Gentamycin) and negative (solvent blank) controls were poured into wells. After incubation for 24h at 37 °C the plates were observed and by measuring zone of inhibition (diameter mm) the compound activity was evaluated. The tests were conducted in triplicate. Gentamycin (10.0µg/ml) was used as positive control. DMSO (10%) was the negative control [12].

**Anti-bacterial activity**

The antimicrobial activity was studied by using the extracts obtained from the aerial parts. A loopful of gram negative and gram positive bacterial strains such as S pyogenes, S aureus, E coli, B cereus, K pneumoniae, S typhi, P aeruginosa and P mirabilis were inoculated to activate the strain in 30ml of nutrient broth in a conical flask and incubated for 24hrs. The media and the test bacterial cultures were inoculated into petri-dishes, in agar well diffusion method. The test strain 0.25ml was inoculated into the media. Adequate care was taken to ensure proper homogenization. Under strict aseptic conditions the experiment was performed. The first medium is solidified, and after that a well was made in the plates with the help of sterile borer (5mm). The extract compound (50µl) was introduced into the well and agar well diffusion method was carried out by favoring perforation of extract. Before inoculating the microorganism, petriplate containing 30ml nutrient agar medium were kept for the solidification. After solidification, the desired numbers of holes of uniform diameter of 8mm were made, using sterile aluminum borer. 0.2ml of compound, positive (Gentamycin) and negative (solvent blank) controls were poured into wells. After incubation for 24h at 37 °C the plates were observed and by measuring zone of inhibition (diameter mm) the compound activity was evaluated. The tests were conducted in triplicate. Gentamycin (10.0µg/ml) was used as positive control. DMSO (10%) was the negative control [12].

**Anti-inflammatory and analgesic activity**

To investigate anti-inflammatory activity, the Eclipta alba extract was given orally. Carragenan induced paw oedema model is used to estimate the anti-inflammatory activity. The release of pro-inflammatory mediators such as prostaglandins (PGs), kinins, tumor necrosis factors (TNF) and nitric acid and activation of platelet activation factors are responsible for inflammation. The Eclipta alba extract is having the action as the potent inhibitor of the pro-inflammatory transcription factors because of this action, it is beneficial for the treatment of the inflammatory cascade of cardiovascular diseases [31].

**Anti-hyperglycemic activity**

The people with diabetes mellitus have more than doubled globally, and which results, most important public health challenges to all nations [32]. And it is the most common disease which is associated with carbohydrate metabolism, affecting about 200 million people worldwide. The suspension of leaf was given by oral intragastric tube. After 60 days of treatment, the rats were fasted overnight and sacrificed by cervical decapitation. The blood glycosylated hemoglobin and glucose were estimated. The rat liver was dissected out and immediately washed thoroughly with ice-cold saline. Potter-Elvehjem homogenizer was used to homogenize the portion of tissue, and the extract was used for the estimations of glucose 6-phosphatase, protein, fructose 1,6-bis-phosphatase, hemoglobin, hexokinase, inorganic phosphorus, and blood urea using a semi-autoanalyzer. The values decreased very much in E Alba administered animals showing the influence of the leaf suspension on sugar reduction. In conclusion, we have demonstrated that the folk medicinal plant EAlba possesses a hypoglycemic effect [33]. It is a potent antihyperglycemic agent [34].

**Anti-anaphylactic activity**

By using different animal models, the antianaphylactic activity of alcoholic extract of Eclipta alba was studied. Each petri dishes were incubated for 10min at 37 °C and then to each petri dish 0.1ml of compound 48/80, a mast cell degranulator was used to induce mast cell degranulation, having concentration of 10µg/ml was added and again incubated for 10min at 37 °C. After that, all the pieces were transferred to 4% HCHO solution which containing 0.1% toluidine blue and kept a side for 20 to 25 minutes. After fixation and staining, mesentery pieces were transferred through acetone and xylene two times and mounted on slides. All the pieces were kept under light microscope with 450x magnification and examined. Disrupted mast cells were determined and minimum of 100 cells were counted and percentage of intact. Disrupted mast cells were stained with toluidine blue and undisrupted mast cells remain as such almost round shaped. Percentage protection from degranulation of mast cells by the drug was determined [35]. Hair growth & Alopecia- In hair oil preparations, the extract of Eclipta alba is used since it enriches hair growth and maintains hair black. Eclipta alba (10%w/v) was an important ingredient in the preparation of herbal formulation for hair growth. Alopecia is a dermal disorder with psychosocial implications on patients with hair loss. It is a well-known Ayurvedic herb for hair growth. A reported work was done in which an ethanolic extracts & petroleum ether
were drowned into oleaginous cream and applied on shaved denuded skin of albino rats. To know the effect of eclipta alba, it is necessary to record the both time (in days), hair growth initiation as well as completion of hair growth. The 2% solution of Minoxidil was applied on skin and served as positive control for comparison. The treatment with 2 and 5% petroleum ether extracts result were better than the positive control that was minoxidil treatment [36].

Antihypertensive activity

The active constituent and the ethanolic extract of *E prostrata* showed remarkable hypertensive activity on rats. The thiophene acetylens, active constituent, cumbin are enriched in roots and which exhibited noticeable antihypertensive activity [5]. Therefore, *Eclipta alba* is a cheap herbal therapy, offer safe & effective measure to produce a potent action on an biggest people’s health problem of high blood pressure [5].

Hepato-protective activity

Generally, the herb is used as a deobstruent (removes obstructions in the body via opening the duct) and cholagogue (promotes the discharge of bile) in hepatomegaly, for jaundice (yellowish and greenish pigmentation), and other ailments of the liver and gall bladder. And the chemical constituents derived from *Eclipta alba* also showed a consequential effect on formation of new liver cell [40]. There was a survey done on total twenty two formulations, among which *Eclipta alba* (bhringraj) was adjacent in 16 hepatoprotective herbal formulations. Among these formulations, the formulation H contains 750mg of bhringraj and 600mg of kasani per 10ml of dose which was the highest amongst all other formulations [41]. The hepatoprotective effect of *Enicostemma littorale* Blume and *Eclipta alba* was performed by Baranisrinivasan et al. [1] during the oxidative stress induced by ethanol in albino rats [42]. Six albino rats of either sex were taken weighing between 180 and 220gm. The oral administration of 25% carbon tetrachloride in liquid paraffin at a dose of 1.25ml/kg daily was induced for five days. The loss of alkaline phosphatase and hepatic lysosomal acid phosphatase by (CCl₄) was significantly rehabilitated by *Eclipta alba* [8]. *Eclipta alba* is responsible for hepatoprotective activity because the levels of hepatic microsomal drug metabolizing enzymes is regulated by *Eclipta alba* [43]. The loss of hepatic lysosomal acid phosphatase and alkaline phosphatase by (CCl₄) was significantly restored by *Eclipta alba*. Hepatoprotective activity of *Eclipta alba* is by regulating the levels of hepatic microsomal drug metabolizing enzymes [41].

Antioxidant activity

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Anticancer activity

The crude methanolic extract of *Eclipta alba* has been tested for its in vitro inhibitory effect against normal intestinal cells and a panel of colon cancer using MTT cytotox assays. The extract of this plant interfere with the multiplication of colon cancer cells, depend upon the concentration and more cytotoxic to cancer cells than to normal cells. The cancer cell lines for further test and assay methods were sent to cancer cell lines, New Delhi to obtain the results [44].

Antioxidant activity

Antioxidants play an important role in barricade and scavenging free radicals, and providing the defence mechanism to

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**Modern Applications of Bioequivalence & Bioavailability**

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humans against degenerative and infection [45]. There are various method through which the antioxidant activity is measured like: - radical scavenging activity, FRAP, reducing activity, and DPPH assay. The antioxidant activity was concentration dependent and showed varying effect as increasing the dose from 25 to 100 mg/ml [37]. The antioxidant activity of E alba extract was assessed in comparison ascorbic acid which is standard antioxidant (Sigma, Germany) on the basis of scavenging effect of the stable 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical procedure. Lower absorbance of the reaction mixture indicated higher free radical- scavenging activity [46]. The phenols contain hydroxyls that are responsible for the radical scavenging effect mainly due to redox properties. The high quantity of ascorbic acid and phenolic content in E alba can explain its stronger free radical scavenging activity [46].

Miscellaneous activity

The dose of 200 mg/kg of alcoholic extract of the plant in rats showed antinociceptive effect. Due to the presence of coumarin compounds, the plant has been reported to possess anti-inflammatory, antinociceptive and bronchodilator activities. And the reports after further studies confirmed the analgesic activity of E alba. Preliminary studies showed the methanolic extract of E Alba is also having immunomodulatory activity. Demethylenewedelolactone and wedelolactone isolated from Eclipta alba exhibited trypsin inhibition [47]. Recently it has been observed that in alloxan induced diabetic rats the administration of the leaf suspension of E alba showed in significant reduction in glycosylated hemoglobin, blood glucose and a decrease in the activities of fructose 1,6-bisphosphatase and glucose 6-phosphatase and an increase in the activity of liver hexokinase, and hexokinases are having the ability to transfer an inorganic phosphate group from ATP to a substrate. On the basis of recent studies have revealed that the E alba extract provided protection against cold restraint induced gastric ulcer formation in rats [8].

Conclusion

After reviewing above literature we can conclude that various diseases and serious infections are treated by Eclipta alba extract. The Eclipta alba extract also showed favorable antifungal and antibacterial activity against various specific strains of respective organisms. Because of its highly medicinal values, the plant has great commercial demand which calls for further investigation at the biomolecular level. Because of this, the species needs prime attention for its cultivation and conservation.

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