

A Review Article

# Antidiabetic effect of *Eclipta alba*

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**Abstract-** *Eclipta alba* (L.) is small branched annual herbaceous plant with a long history of traditional medicines uses in many countries mainly in tropical and subtropical regions. It is widely distributed throughout India, China, Thailand, and Brazil. The herb has been known for its curative properties and has been utilized as antimetastatic, analgesic, antibacterial, antihepatotoxic, antihemorrhagic, antihyperglycemic, antioxidant, immunomodulatory properties and it is considered as a good rejuvenator too. Recent studies showed an antivenom property & corrosion pickling inhibitor action on mild steel in hydrochloric acid. A wide range of chemical compounds including coumestans, alkaloids, thiopenes, flavonoids, polyacetylenes, triterpenes and their glycosides have been isolated from this species. This contribution provides a comprehensive review on ethnomedicinal uses, chemical composition, and the antidiabetic property as medicinal plant. Oral administration of leaf suspension of *E. alba* (2 and 4 g/kg body weight) for 60 days results in significant reduction in blood glucose, glycosylated hemoglobin HbA(1)c. The extract decreases the activities of glucose-6- phosphatase and fructose-1,6-bisphosphatase, and increase the activity of liver hexokinase. Thus, oral administration of *E. alba* possess potent antihyperglycemic activity [1].

## 1 Introduction

Herbal medicine is the oldest form of healthcare known to mankind. Herbs had been utilised by all cultures throughout history. It was an integral part of the development of modern civilization. Primitive man observed and appreciated the great diversity of plants available to him. The plants provided food, clothing, shelter, and medicine. Much of the medicinal use of plants seems to have been developed through observations of wild animals, and by trial and error. As time passes off, each tribe added the medicinal power of herbs in their area to its knowledge base. They methodically collected information on herbs and developed well-defined herbal pharmacopoeias. Indeed, well into the 20th century much of the pharmacopoeia of scientific medicine was derived from the herbal lore of native peoples. Many drugs commonly used today are of herbal origin. Indeed, about 25 percent of the prescription drugs dispensed in the Herbal medicine is a major component in all indigenous peoples' traditional medicine and a common element in Ayurvedic, homeopathic, naturopathic, traditional oriental, and Native American Indian medicine. WHO notes that of 119 plant-derived pharmaceutical medicines, about 74 percent are used in modern medicine in ways that correlated

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directly with their traditional uses as plant medicines by native cultures. Major pharmaceutical companies are currently conducting extensive research on plant materials gathered from the rain forests and other places for their potential medicinal value. This article has an objective to collect scattered scientific information on the herbs of hypoglycemic activity and to provide present status of plants on which antidiabetic activity has been done.

Diabetes and its different types is an age old disease for clinicians since centuries. Many aspects of Diabetes needs to be explored with respect to physiological actions of insulin and the various clinical features of this disease such as tissue complication , since this is life style disease , so proper treatment in relation to diet and antidiabetic agents is emphasized In fact, herbal treatment for diabetes is not new. Plants and plant extracts were used to combat the disease as early as 1550 B.C., with as many as 400 "prescribed" before the development earlier this century of effective medications to control diabetes. In this paper an attempt has been made to give an overview of certain Indian plants with their phytoconstituents and mechanism of action which have been studied for their antidiabetic activity[2].

## 2 Diabetes mellitus

Diabetes mellitus is a common and very prevalent disease affecting the citizens of both developed and

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developing countries. It is estimated that 25% of the world population is affected by this disease. Diabetes mellitus is caused by the abnormality of carbohydrate metabolism which is linked to low blood insulin level or insensitivity of target organs to insulin [3]. Despite considerable progress in the treatment of diabetes by oral hypoglycemic agents, search for newer drugs continues because the existing synthetic drugs have several limitations. The herbal drug, *Eclipta alba* with antidiabetic activity are yet to be commercially formulated as modern medicine, even though they have been acclaimed for their therapeutic properties in the traditional systems of medicine [4]. The plant provide a potential source of hypoglycemic drug because many plants and plant derived compounds have been used in the treatment of diabetes. Many Indian plants have been investigated for their beneficial use in different types of diabetes and reports occur in numerous scientific journals. Ayurveda and other traditional medicinal system for the treatment of diabetes describe a number of plants used as herbal drugs. Hence, they play an important role as alternative medicine due to less side effects and low cost. The active principles present in medicinal plants have been reported to possess pancreatic beta cells regenerating, insulin releasing and fighting the problem of insulin resistance [5]. Hyperglycemia is involved in the etiology of development of diabetic complications. Hypoglycemic herbs increase insulin secretion, enhance glucose uptake by adipose or muscle tissues and inhibit glucose absorption from intestine and glucose production from liver [6]. Insulin and oral hypoglycemic agents like sulphonylureas and biguanides are still the major players in the management but there is quest for the development of more effective anti-diabetic agents.

### 3 Antidiabetic activity

The chloroform extract of *eclipta alba* exhibited significant antidiabetic activities in diabetic patients. This extract has showed improvement in parameters like body weight and lipid profile by enhancing effect on cellular antioxidant defences to protect against oxidative damage. Present efforts are directed to isolate the active constituents from

this fraction and confirmation of mechanism of action [7, 8].

Table1: *Eclipta alba* contains active constituents which have pharmacological activities

S.No.	Chemical constituents	Pharmacological activities
1.	Wedelolactone	Antihepatotoxic[9], Antivenom[10], Antibacterial[11], Trypsin Inhibitor
2.	Dasyscyphin C	Anticancer[12], Antiviral
3.	Demethylwedelolactone	Antihepatotoxic[13], Antivenom[10], Antihaemorrhage[14], Dye (cosmetic)[15]
4.	Eclabosaponins	Antigardial[16], Hair revitalizing[17], Antiproliferative[18,19]
5.	Eclabatin	Antioxidant[20]
6.	Ecliptalbine, verazine	Analgesic[21], Lipid lowering

### 4 Material and Method

*Eclipta alba* powdered drug was extracted with 50% ethanol by cold maceration ( I.P 1985) [22]. The solvent was removed at low temperature & reduced pressure and extract stored in a refrigerator prior to pharmacological studies. The extract yield was 13.2% (w/w) in terms of starting material. The dried mass of the extract was macerated with 1% gum acacia & suspended in distilled water to be given orally with a catheter (EA 100 and 250 mg/100g).

Leaf suspension of *Eclipta alba* (2 & 4g/kg) orally in alloxan induced diabetic rats resulted in reduction in blood glucose level, glycosylated hemoglobin. There was decreased activity of glucose-6 phosphatase and fructose1,6-bisphosphatase, and an increase in the activity of liver hexokinase. Thus oral administration of *Eclipta alba* suspension possess potent antihyperglycemic activity[23]. *Eclipta alba* as an ingredient in polyherbal formulation Pan-five were scientifically and clinically proved to possess Antidiabetic and diuretic activity by acting upon pancreas by restoration and regeneration of pancreatic  $\beta$ -cell activity [24].

**Selection of Patients:** One hundred type 2 diabetic patients visiting a private clinic, Ghaziabad, were selected for the study. Information on socio economic background of selected patients was elucidated using a framed questionnaire. Among hundred diabetics studied, sixty subjects were selected for further study. The subjects selected

were on sulfonylurea (Oral Hypoglycemic Agents)users, BMI between 20-25 kg/m<sup>2</sup> and who were involved in sedentary activity and age group between 35-60 years. They were divided into control and experimental groups each containing 30 subjects Administration of Tablets to the Selected Diabetes. The subjects were given a pack of 30 tablets for every 15 days of the study period. They were asked to take two tablets daily with one tablet each after breakfast and dinner for a period of 90 days. Both control and experimental group subjects were advised to take a standardized diet which had calories restricted between 1,500 to 1,800 Kcal. This was achieved by giving awareness about the food exchange list, the subjects and their diet intake was verified once in every fifty days.

### 5 Bio-Chemical Analysis

To study the antidiabetic property of *E.alba* leaves tablets on the selected type 2 diabetic patients Glycated haemoglobin (%) (HbA1c) and Post Prandial Blood Glucose (after two hours of the diet) had been studied. Commercially available kit was used for the analysis and analysis carried out in the auto analyzer.

### 6 Results And Discussion

Table 2, shows the change in blood glucose and body weight and Table 3, gives the picture about the blood glucose level of diabetic patients during the study period. Post prandial blood glucose level showed a reducing trend in both control and experimental groups. But the reduction in post prandial blood glucose levels in *E.alba* leaf tablet supplemented experimental group was significant. Initially in experimental group, post prandial blood glucose level was 210 mg/dl and it reduced to 191, 174 and 150 mg/dl respectively after the first, second and third month of supplementation. In control group post prandial blood glucose level was reduced to 169, 167, 163 mg/dl respectively after first, second and third month of study from the initial value of 179 mg/dl, *E.alba* leaf tablet had a significant role in reducing the blood glucose level of diabetics.[25]

**Table 2: Changes in Blood Glucose & Body weight in control when treated with *E. alba***

Group	Blood glucose(mg/dl)		Body weight in Kg		Changes in body weight
	Initial	Final	Initial	Final	
Control(glucocare)	F-110	105	42	43	1
	PP-180	170			
Control + <i>E.alba</i>	F-120	100	42	50	8
	PP-180	110			
Diabetics+ <i>E.alba</i> (2g /Kg Body weight)	F-110	100	47	50	3
	PP-220	150			
Diabetics + <i>E.alba</i> (4g/Kg Body weight)	F-110	85	50	56	6
	PP-220	120			

**Table 3. Mean post prandial blood glucose (mg/dl) level of the control and experimental groups**

	Initial	1 <sup>st</sup> Month	2 <sup>nd</sup> Month	3 <sup>rd</sup> Month
Control Group	179	169	167	163
Experimental Group	210	191	174	150

### 7 CONCLUSIONS

Diabetes is a disorder of carbohydrate, fat and protein metabolism attributed to diminished production of insulin or mounting resistance to its action. Herbal treatments for diabetes have been used in patients with insulin-dependent and non-insulin-dependant diabetes, diabetic retinopathy, diabetic peripheral neuropathy, etc. Scientific validation of several Indian plant species has proved the efficacy of the botanicals in reducing the sugar level. There are several plants known for their antidiabetic activity, with different mode of action and phytoconstituents. This is an effort to streamline the phytoconstituents of specific family with specific mode of action to reduce plasma glucose. Keeping in view from the reports on their potential effectiveness against diabetes, it is assumed that the botanicals have a major role to play in the management of diabetes, which needs further exploration for necessary development of drugs and nutraceuticals from natural resources[26].

*Eclipta alba* offers a remarkable activity for curing of many diseases. It has a wide range of chemical constituents. Clinical investigations have been done on pharmacological activities like hepatotoxicity, proliferative, diabetic, hypolipidemic etc. Both male and female volunteers, blood glucose level had reduced after the administration of leaf tablet. It concluded that *Eclipta alba* leaf tablet have a significant impact on antidiabetic property of the selected patients.

The antidiabetic effect of the ethanolic extract of *Eclipta alba* (EEA) on hyperglycaemia and diabetic

nephropathy was investigated in streptozotocin-induced diabetic rats. Single-dose treatment of EEA to streptozotocin-induced diabetic rats lowered the blood glucose level by 17.6% ( $p < 0.05$ ) at 250 mg kg<sup>-1</sup> dose after 5 h post oral administration. Treatment of animals after 10 weeks of STZ-treatment with EEA (250 mg kg<sup>-1</sup>) for 21 days significantly reduced the elevated levels of blood glucose, %HbA1C, urea, uric acid and creatinine, and significantly increased the depressed serum insulin level. The extract exerted a significant inhibitory effect on alpha-glucosidase in a noncompetitive manner with an IC<sub>50</sub> value of around 54 µg mL<sup>-1</sup> and was found inhibitory to eye lens aldose reductase with an IC<sub>50</sub> value of around 4.5 µg mL<sup>-1</sup>. The results suggest that EEA possesses antidiabetic effect associated with alpha-glucosidase and aldose reductase inhibition.

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