Original Article

Antidiabetic Activity of Aerva lanata Linn Juss by Using Alloxan Induced Diabetic Rats

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Objective: To prescreen the in vivo anti diabetic activity of the aerial parts of the plant Aerva lanata Family Amaranthaceae by using alloxan inducing diabetic rats. Method: In the present study to investigate the effect of alcoholic extract of Aerva lanata was selected for phytochemical and anti diabetic activity. Anti diabetic activity was determined by reduction of increased blood glucose level alloxan-induced diabetic rat. Result: Preliminary phytochemical screening of alcoholic extract of Aerva lanata (AEAL) showed the presence of alkaloids, flavonoids, terpinoids, carbohydrates, sterols, tannins, saponins, cardio glycosides, amino acids, proteins, methyl grevillate, lupeol, lupeol acetate benzoic acid and β-sitosteryl acetate. The antidiabetic activity of AEAL determined by using the alloxan induced diabetic rats shows that the effect of decreased the blood glucose level. The reduction of blood glucose level in 2nd week by (P<0.01) significantly. Conclusion: Aerva lanata have been used in medicine due to various biological activities. This study indicates that the alcoholic extract of Aerva lanata possesses potential anti diabetic activity. The presence of alkaloids in alcoholic extraction of the aerial parts of the plants Aerva lanata appears to contribute to its activity. Further investigation requires to confirm this activity.

Keywords: Aerva lanata, Amaranthaceae, Anti diabetic activity, Alloxan induced rats, tolbutamide.

1. INTRODUCTION

Medicinal plants are the most important source of life saving drugs and have been widely used for the treatment of diseases in traditional way for several years. An interaction between ancient medicine and biotechnological tools is to be established towards newer drug development. The interface between cell biology, structural chemistry and in vitro assays
will be the best way available to obtain valuable leads. The value of plants lies in the potential access to extremely complex molecular structure that would be difficult to synthesize in the laboratory. In spite of an increasing awareness and expenditure of resources, the incidence of chronic diseases like cardiac, cancer, diabetes etc. has not declined and in fact is rising at an alarming rate. Herbal medicine is based on the premise that plants contain natural substances that can promote health and alleviate illness. Diabetic mellitus is a metabolic disorder characterized by disturbances in carbohydrate, protein, lipid metabolism and by complications like microvascular (retinopathy, neuropathy and nephropathy) and macrovascular (heart attack, stroke and peripheral vascular disease) complications. Currently available synthetic antidiabetic agents produce serious side effects like hypoglycemic coma and hepato renal disturbances.

Aerva lanata Juss. (Family: Amaranthaceous) locally known as ‘bui’ is an erect, prostrate under shrub and occurs throughout India as a common weed in fields and waste places. The plant is diuretic, used in lithiasis. The root is a demulcent, diuretic, useful in strangury (slow to be and painful discharge of urine). The roots are used in the treatment of headache. The plant is regarded as a demulcent on the Malabar Coast. It is valued for cough in Ceylon; also as a vermifuge for children. The Meena tribals of the Sawaimadhopur district of Rajasthan give orally the juice of the roots to patients of liver congestion, jaundice, biliousness and dyspepsia. They also give decoction of the whole plant to cure pneumonia, typhoid and other prolonged fevers. Previous chemical investigations have shown the presence of alkaloids, flavonoids, carbohydrates, phosphate, potassium, calcium, magnesium, zinc, ferrous, manganese, tannins, proteins and also contains methyl grevillate, lupeol, lupeol acetate benzoic acid, β - sitosteryl acetate. Most of the therapeutic properties of this plant are attributed to alkaloids which has considerable attention due to their pharmacological effects.

2. MATERIALS & METHODS

All chemicals and reagents used for this study were of analytical grade and procured from approved organization.

Collection and authentication of the plant Aerva lanata

Fresh aerial parts of the plant Aerva lanata juss. selected for our study was collected from Uppoor, Ramanathapuram District, Tamil Nadu, India during the month of July 2015 and was authenticated by Dr.Stephen, Department of Botany, American college, Madurai and Dr.Sasikala Director (Retd) of Siddha Central Research Institute, Arumbakkam, Chennai.

PREPARATION OF EXTRACTION

The aerial parts of AL were shade dried at room temperature. The shade dried roots were coarsely powdered and subjected to extraction with petroleum ether in a Soxhlet apparatus for removal of fats. The defatted marc was subsequently subjected to alcohol extraction. This alcohol extract was utilized for the further investigation.

Preliminary phytochemical screening

Preliminary phytochemical screening was carried out using appropriate solvent extract of the plant to identify the presence and absence of various phytoconstituents like alkaloids, carbohydrates, flavonoids, etc.,

Determination of total phenolic content

The total phenolic content in AEAL was determined spectrophotometrically by Folin-Ciocalteu method calibrating against gallic acid standards and expressing the results in gallic acid equivalent and defined as mg gallic acid /L.

Determination of total flavonoid content

The flavonoid content of AEAL was estimated by aluminium chloride method. In this method, aluminium chloride complexes with flavonoids of C3-C5 hydroxyl group and to produce intense colour in acidic medium. The intensity of the colour is proportional to the amount of flavonoids and can be estimated as quercetin equivalent at wavelength of 415nm.

Acute toxicity studies

Acute oral toxicity study of AEAL was studied in healthy rats (n=3) according to the guidelines set by Organisation for Economic Cooperation and development (OECD) guidelines . Starting dose was selected to be 2000mg/kg b.w. and finally a dose of 4000mg/kg b.w. was evaluated for toxicity. The animals were observered continuously for 24h for mortality.

Antidiabetic Activity

The animals were divided into four groups of six animals each as follows:

- Group I- vehicle control, Normal saline (0.9%W/V Nacl);
- Group II- Diabetic control;
- Group III- Diabetic standard treated, 0.5mg/kg of tolbutamide;
- Group IV-Diabetics AEAL, 200mg/kg;

Diabetics was induced in all groups except normal control by a single intra peritoneal injection of 60 mg/kg of alloxan dissolved in a freshly prepared 0.1 m citrate buffer (pH 4.5). The animals in the vehicle control (Group I) received normal saline orally (0.9%W/V Nacl). The rats with blood glucose levels above 250mg/dL were considered as diabetic and used in this study. After 72h, the blood was withdrawn by retro orbital puncture under light ether anaesthesia and the blood glucose level was estimated. Serum was separated by centrifugation at 3 000 rpm for about 5 minutes. The clear straw coloured serum was collected and stored at 40C for the measurement of marker enzymes level to assess the liver functions. Blood glucose levels and body weight were measured on day 0, 7 and 14 of the study. Finally on day 14, blood was collected to perform various biochemical parameters.

3. RESULTS

Preliminary phytochemical screening of appropriate solvent extract of the plant showed the presence of alkaloids,
4. DISCUSSION

Antimicrobial, Diuretic and Anti-urolithiasis, Antifertility activity, Anti cancer, Hypolipidemic and Anti-diarrhoeal, Antiulcer, Anti asthmatic, Anti-HIV activity, Anthelmintic, Anti inflammatory, Analgesic, Antinociceptive, Anti oxidant, Nephroprotective, Anti hepatotoxicity, Cytotoxicity, Acute renal failure and Immunomodulatory 14-17. Preliminary phytochemical screening of alcoholic extract of Aerva lanata(AEAL) showed the presence of alkaloids,flavanoids, methyl grevillate, lupeol, lupeol acetate benzoic acid, β-sitosterol acetate and tannic acid 18.

The results of elvated blood glucose level is reduced by alcoholic extract of aerial parts of Aerva lanata. Alkaloids are present in this plant are known to have bioactive antidiabetic activity. The present findings may pave the way for the bioactivity guided fractionation and the isolation of novel lead compounds in Aerva lanata for the antidiabetic activity which will be useful for the design and synthesis of potent antidiabetic and antihyperlipidemic compounds hence beneficial for the patients. However, further studies are underway to isolate the lead molecules responsible for the activity and also to pinpoint on the mechanism of action of the same[19-20].

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6. REFERENCES


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