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Antidiabetic potential of *Butea monosperma* in rats

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Abstract

The antihyperglycemic activity of the ethanolic extract of *Butea monosperma* (BMEE) was studied in glucose-loaded and alloxan-induced diabetic rats. Single dose treatment of BMEE (200 mg/kg, p.o.) significantly improved glucose tolerance and caused reduction in blood glucose level in alloxan-induced diabetic rats. Repeated oral treatment with BMEE (200 mg/kg/day) for 2 weeks significantly reduced blood glucose, serum cholesterol and improved HDL-cholesterol and albumin as compared to diabetic control group.

Keywords: *Butea monosperma*; Antihyperglycemic; Antidiabetic activity

1. Introduction

Diabetes is a major health problem worldwide; approximately 5% of the world's population suffer from diabetes. Worldwide projections suggest that more 300 million people will have diabetes by the year 2025 and the global cost of treating diabetes and its complication could reach US$1 trillion annually. Nowadays, herbal drugs are gaining popularity in the treatment of diabetes and its complications. The major merits of herbal medicines seem to be their efficacy, low incidence of side effects and low cost [1].

Butea monosperma is a medium sized tree commonly found throughout India, except in the arid regions. Flowers are typically papilinaceous, the stigma is wet papillate and the style is hollow. They are reported to possess astringent, diuretic, depurative, aphrodesiac and tonic properties [2]. Anticonvulsive [3], antiimplantation [4] and antihepatotoxic [5] activities of flowers of *B. monosperma* are also documented. Moreover, preliminary studies have indicated hypoglycemic [6,7] activity of *B. monosperma* flowers.

In this study the effect of ethanolic extract of *B. monosperma* flowers on blood glucose and biochemical parameters such as serum cholesterol, HDL-cholesterol, total protein, albumin, triglyceride and alkaline phosphatase were investigated in normal, glucose-loaded rats and alloxan-induced diabetic rats.

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2. Experimental

2.1. Plant material

B. monosperma (Papilionaceae) flowers collected near the river Godavari at Nashik in March 2003 were authenticated by Dr. S.C. Pal, Head, Department of Pharmacognosy, NDMVP's College of Pharmacy, Nashik. A voucher specimen (No. 24417) was deposited in the Botanical Survey of India, Pune.

2.2. Extraction

B. monosperma flowers shade dried were extracted with EtOH under reflux. The extract filtered and evaporated in vacuo gave a raw residue (yield 8.6% w/w). A phytochemical screening of the residue revealed the presence of flavonoids, saponins and sterols.

2.3. Animals

Wistar rats weighing 200–250 g of either sex were used. Animals were housed in standard environmental conditions. They had free access to food and water up to 18 h before and during the period of experiment. The Institutional Animals Ethics Committee approved the protocol of the study.

2.4. Chemicals

Alloxan (S D Fine-Chem, India), insulin (USV Ltd., India) and glibenclamide (Sun Pharma, India) were used in this study. Other chemicals used were of analytical grade and were obtained from Qualigens, India.

2.5. Effect of BMEE on normal fasted rats

The extract was solubilized in saline doses of 50, 100 and 200 mg/kg b.w., and administered orally. The reference standard glibenclamide (0.40 mg /kg) and insulin (1 IU/kg) were administered by oral and subcutaneous routes, respectively. For blood glucose determination, blood was obtained by snipping tail with sharp razor [8]. The blood glucose concentration in normal fasted rats was determined using One Touch glucometer (Johnson and Johnson, India) at 0, 2, 4, and 6 h after treatment.

2.6. Effect of BMEE on oral glucose tolerance in rats

After overnight fasting, animals were divided in 3 groups. Group 1 used as control received saline, groups 2 and 3 received by oral route BMEE 200 mg/kg and glibenclamide 0.40 mg/kg, respectively. Two hours later, glucose (1.5 g/kg, p.o.) was administered to all rats. The blood glucose was determined using glucometer at 0, 1/2, 1 and 2 h after glucose administration.

2.7. Effect of BMEE on alloxan-induced diabetic rats

2.7.1. Single dose treatment

Animals were allowed to fast overnight and injected with 120 mg/kg, s.c. of alloxan monohydrate. After a week, rats with marked hyperglycemia (blood glucose >250 mg %) were used for the study. The blood samples were collected from diabetic control group and blood glucose was determined using glucometer. BMEE (200 mg/kg) and glibenclamide (0.40 mg /kg) were given orally and blood glucose was determined at 0, 2, 4 and 6 h after treatment.

2.7.2. Repeated dose treatment

The diabetic rats (blood glucose >250 mg %) were divided into three groups of five each. Animals were treated once a day for 2 weeks with saline (0.1 ml), BMEE (200 mg/kg) and glibenclamide (0. 40 mg /kg). Six hours after the last treatment, blood was collected and the serum separated for estimation of cholesterol, HDL-cholesterol, total