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Research Article
**ANTIHYPERGLYCEMIC EFFECT OF THE LEAVES
OF MELIA AZEDARACH ON ALLOXAN INDUCED
DIABETIC RATS**



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Abstract

Diabetes is not new to the medical world. It has been known since antiquity, almost from 1500 BC. According to Charaka (2nd century B.C.) it is called PRAMEHA, i.e. the causative significance of heredity, obesity and lack of physical activity; clinical features such as thirst and dryness of mouth; peculiar odour; burning sensation or lack of sensation in the hands and feet; and onset of boils. The present study is a step towards the controlling of this disease by using the leaves of *Melia azedarach*. The ethanolic extract of leaves of *Melia azedarach* in alloxan induced diabetic rat shows marked decrease in the blood glucose level in the two different doses of 300 mg/kg and 600 mg/kg for 21 days and the effect was compared with diabetic control. The effect of extract also shows significant reduction in blood glucose level in glucose tolerance test.

Keywords: - : *Melia azedarach*, Blood glucose level, Ethanolic extract, Alloxan Induced diabetic rats

Introduction

Diabetes mellitus is a group of endocrine syndromes characterized by hyperglycemia: altered metabolism of lipids, carbohydrates, and proteins: and an increased risk of complications from vascular disease. Most patients can be classified clinically as having either type I diabetes mellitus (Goodman Gillman 2001). Diabetes mellitus has been treated orally with herbal remedies based on folk medicine since ancient times. There is an increasing demand by patients to use the natural products with antidiabetic activity due to side effects associated with the use of Insulin and oral hypoglycemic agent (kameswara Rao et al., 1997). Traditional herbal remedies represent new avenues in the search for alternative hypoglycemic drugs. *Melia azedarach* is a species of deciduous tree in the mahogany family, Meliaceae, that is native to India, southern China and Australia. Common names include Persian Lilac, White Cedar, Chinaberry, Bead Tree (Jabeen K et al., 2010).

Melia azedarach is an important medicinal plant which is used for the various ailments in Ayurvedic system of medicines. The biological investigation have shown that many of the medicinal properties found in the various parts of the plant. It has variety of uses such as antifungal (Jabeen K., et al., 2010), potent insecticidal (Xu H., et al., 2010), anti-inflammatory (Al-Badrani et al., 2002), analgesic (Vishnukanta et al., 2010), hepatoprotective (Rao et al., 2012), viral infections (Barquero et al., 1997), antiulcer (Bahuguna et al., 2009), stress-induced ulcers (Hanifa et al., 1984), lymphocytic leukemia (Itokawa et al., 1995). The extract of leaves of *Melia azedarach*, which contains highest amount of phenolic compounds, exhibited the greatest anti-oxidant activity (Nahak et al., 2010) The present study was undertaken to study the hypoglycemic effect of ethanolic extract of leaves of *Melia azedarach* in alloxan induced diabetic rats.

Thus the present study aims to investigate for

the antidiabetic property because of high anti-oxidant activity in the leaves of this plant.

MATERIALS & METHODS

Plant material :

Fresh and young green leaves of *Melia azedarach* were collected from the hisar agriculture university, Hisar, Haryana and got identified by Dr. H.B. Singh Scientist G & Head, Raw Material Herbarium and museum (RHMD) with reference no. (NISCAIR/RHMD/Consult/2011-12/1766/66). The leaves were washed under running water to remove dust and then shaded dried and were crushed to moderately coarse powder.

Preparation of extract :

The plant material was extracted with 90 % ethanol using soxhlet apparatus. A green color extract was obtained, the extract was cooled and filtered to remove the residue. Then solvent was removed 1st by distillation then by rotavapour under reduced pressure and then traces of solvent were removed on water bath. Further extract was dried in desiccator.

Experimental animals:

The protocol of the study was approved by the concerned ethical committee for animal experimentation with no. (Bu/Pharm/IACE/11/036). The rats were obtained from Department of Pharmacy, Bundelkhand University, Jhansi and kept in the animal house in standard conditions. Male wistar rats of sprague dawley stain weighting b/w 180-250 gm were used for the antidiabetic activity and were free access on commercial diet and water *ad libitum* during the whole period of experiment.

They were acclimated to the laboratory conditions before carrying out any experimental work. Diabetes mellitus was induced by administering intravenous injection of alloxan monohydrate (70 mg/kg body weight, CDH company,) (Badole *et al.*, 2006). After two days administration of alloxan, fasting blood glucose was determined and rats with blood glucose of 250-400 mg/dl were included in the study.

Sample collection :

Blood samples were collected from retro-orbital route and assessed for blood glucose level by the GOD-POD method.

EXPERIMENTAL DESIGN

Effect of Ethanolic extract of leaves of *Melia azedarach* on blood glucose level of alloxan induced diabetic rats:

After checking the FBG in overnight fasted diabetic rats, they were divided into four groups having five rats in each group. Group I serve as diabetic control was given vehicle (Normal Saline) and other group II & III received ethanolic extract of doses 300 mg/kg and 600 mg/kg orally and group IV received the standard drug i.e. glibenclamide 2 mg/kg orally (Nayak B. S.*et al.*, 2010). The effect of plant extract and standard drug on BGL was estimated on overnight fasted rats on days 7, 14 and 21th. The basal values are of 0 day on which extract was started.

Effect of Ethanolic extract of leaves of *Melia azedarach* on glucose tolerance in glucose loaded rats:

Effects of ethanolic extract was also assessed by glucose tolerance test, the rats were divided into four groups, 1st, the control group received vehicle (Normal saline) and group II and III received the two different doses of ethanolic extract i.e. 300 mg/kg & 600 mg/kg body weight orally and group IV received standard drug glibenclamide 2 mg/kg. The rats of all the groups received glucose (2g/kg) (Kesari *et al.*, 2005) 30 minute after the extract and drug administration. Blood samples were collected just prior to glucose administration (0h) and 30, 60 and 120 min after glucose loading and blood glucose level were measured by glucometer (Accucheck comfort). (Vats *et al.*, 2002)

Phytochemical screening methods

Ethanolic extract was analyzed for the presence of various phytoconstituent by performing different qualitative chemical test and it showed the presence of alkaloids, tannins, saponins, phenols, glycosides, steroids, terpenoids and flavonoids.

Statistical analysis

The relative blood glucose levels were compared using one way analysis of variance (ANOVA) followed by Dunnett's tests. P value less than 0.05 were considered to be significant.

RESULT & DISCUSSION

The Ethanolic extract of the leaves of *Melia azedarach* showed marked effect for decreasing the blood glucose level and rectifying the problems like fatigue, irritation etc. associated with the disease. Two concentration of the extract were used for the investigation i.e. 600 mg/kg and 300 mg/kg against the standard glibenclamide 2 mg/kg for twenty one days. Both of the concentration of extract showed marked decrease in blood glucose levels. When the effect of the extract was checked by the

glucose tolerance test in glucose loaded rats. The extract shows marked effect on the blood glucose level with 300 mg/kg and 600 mg/kg showed the significant decrease in BGL.

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Table 1 : The antihyperglycemic effect of ethanolic extract of leaves of *Melia azedarach* on alloxan induced diabetic rats.

Gp	Dose (mg/kg)	Blood Glucose Level (mg/dl) at day			
		Basal value	Day 7	Day 14	Day 21
I	Normal Control	77.30± 3.22	79.62 ± 3.3	76.6± 2.4	78.3± 2.5
II	Diabetic control	295.2 ± 4.67	290.6 ± 3.15	275.2 ± 2.67	263.2±1.30
III	<i>Melia azedarach</i> (EE) (300 mg/kg)	293.3 ± 3.62	260.8 ± 2.65 **	211.6 ± 3.65 **	166.2±3.35**
IV	<i>Melia azedarach</i> (EE) (600 mg/kg)	290.10±4.12	232.4 ± 2.56 **	176.3 ± 2.26 **	112.2 ± 2.32 **
V	Glibenclamide (2mg/kg)	288.3±3.12	234.5 ± 2.31 **	170.5 ± 2.21 **	102.3 ± 3.21. **

** p < 0.01 show significant when compare with group II. EE=Ethanolic extract.

Table 2 The antihyperglycemic effect of ethanolic extract of leaves of *Melia azedarach* on glucose loaded rat.

Gp	Dose (mg/kg)	Blood Glucose Level (mg/dl)			
		0 hour	30 minutes	60 minutes	120 minutes
I	Control (Glucose) (2 gm/kg)	76.2±2.30	166.8± 1.35	153.8± 2.24	141.3± 1.64
II	<i>Melia azedarach</i> (EE) (300 mg/kg)	82.3±2.23	148.3±2.54 **	132.2±3.34**	117.8±3.10 **
III	<i>Melia azedarach</i> (EE) (600 mg/kg)	77.3±3.30	140.8±2.56 **	114.4 ± 2.38 **	92.5± 1.68 **
IV	Glibenclamide (2 mg/kg)	78.5 ± 2.54	137.2±3.35**	108.5±3.21 **	79.4±2.38 **

**p < 0.01, show significant when compare with control

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