



IN-VIVO ANTIDIABETIC ACTIVITY OF ETHANOLIC FLOWER EXTRACT *MELIA AZEDARACH* L

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ABSTRACT

Throughout the world there are several medicinal plants with proven beneficial claims towards different pathological conditions. Medicinal plants constitute an important source of potential therapeutic agents for diabetes. *Melia Azedarach* L is closer the family of neem, has a potential biological activity as *Azadirachta indica*. This study aimed to determine the antihyperglycemic effect of ethanolic flower extract of *Melia Azedarach* L (200mg/kg) against Streptozocin (STZ, 60mg/kg, i.p) induced diabetes in rats. Glibenclamide (0.25mg/kg) was used as reference control. The test drugs were administered for 15 days once daily. The mean blood sugar levels were determined at different time intervals. The result showed that, there was a significant reduction in the blood sugar after the administration of ethanolic flower extract of *Melia Azedarach* L in STZ induced diabetic animals. From the result it was concluded that, ethanolic flower extract of *Melia Azedarach* L possess antidiabetic activity against STZ induced diabetic in rats.

INTRODUCTION

Diabetes mellitus is a disease characterized by an altered glucose homeostasis and persistent hyperglycemia leading to many complications. Around 230 million people worldwide have been affected by diabetes and around 366 million people are expected to get affected by 2030[1]. In India it was estimated that, in 2007, 41 million of Indians were have diabetes, thereby amounting to 19% of the total population [2]. This means that approximately one in every five diabetics is an Indian [3]. It is estimated that this number will rise to around 66-70 million by 2025 [4,5]. This is expected to reach 79.4 million by 2030[6]. However, the growth is faster than expected as a research study undertaken in 2011 found that India has 61.3 million diabetic patients second only to China with 90 million diabetic patients [7].

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Various hypoglycemic agents such as biguanides and sulphonyl urea are available along with insulin for the treatment of diabetes mellitus, but have side effects associated with their uses [8]. There is a growing interest in herbal remedies because of their effectiveness, minimal side effects in clinical experience and relatively low costs. Herbal drugs or their extracts are prescribed widely, even when their biological active compounds are unknown. Even the World Health Organization (WHO) approves the use of plant drugs for different diseases, including diabetes mellitus. Traditional plant medicines are used throughout the world for treatment of diabetes mellitus.

Melia azedarach L. is a small to medium size deciduous tree or shrub of 5-15 meter in height, a close relative of Neem, from the Meliaceae family widely distributed in tropical and subtropical countries. The *Melia azedarach* L contains a number of potential organic molecules *i.e.* flavonoids, terpenoids, steroids and anthraquinones [9]. Ethanobotanical survey reveals the use



of *Melia azedarach* L in sciatica, lumbago, piles, cough, asthma, ulcers, wounds, diabetes, intermittent fever, post labor pain in uterus, amenorrhea and in leucoderma [10].

The leaves of *Melia azedarach* L has reported for various biological activities like, antimalarial, antimicrobial, antipyretic, Skin disorders, Analgesic and anti-inflammatory. Seed possess antirhumatoid activity, antibacterial and antiplasmodial activity. Bark has antibacterial, antipyretic and wound healing activities [11]. Very few biological activities so far reported in the flowers of *Melia azedarach* L. The aim of this study is to study the antidiabetic potential of ethanolic flower extract of *Melia azedarach* L against streptozocin induced diabetic in rats.

MATERIAL AND METHODS

Plant Material

The flowers of *Melia azedarach* L were collected from outskirts of Erode, in the month of May. The *Melia azedarach* L flowers were identified and authenticated by the botanist, Botanical Survey of India, Agricultural University, Coimbatore. The (voucher no:45/212) specimen has been deposited in the herbarium for future reference.

Preparation of Extract

100 gm of coarsely powdered flower of *Melia azedarach* L was soaked in 250 ml of 90 ethanol solution for 24 hrs followed by cold maceration for further 48 hrs with occasional shaking. The mixture was filtered using muslin cloth followed by removal of excess of solvent by means of rotatory evaporator. The dried extract was used for the study.

Animals

Male Wistar Albino rats weighing between 180–220 g were used for the study. The animals were obtained from animal house of Sri Lakshminarayanan Institute of Medical Sciences, Pondicherry, India. On arrival the

animals were placed at random and allocated to treatment groups in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of $24 \pm 2^\circ\text{C}$ and relative humidity of 30–70 %. A 12:12 light: dark cycle was followed. All animals were allowed free access to water and fed with standard commercial pelleted rat chaw (Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics Committee (932/a/06/CPCSEA) and were in accordance with the guidelines of the IAEC.

Experimental Induction of Diabetes

Type 2 diabetes mellitus was induced in rats by a single i.p. injection of freshly prepared STZ (60mg/kg) in 0.1M citrate buffer (pH 4.5) in a volume of 1ml/kg [12]. Two days after STZ administration, rats with blood glucose concentration in the range 200–300mg/dl were considered diabetic and were included in the study.

Experimental Design

A total of 24 rats were divided into four groups of six each. Group I were normal untreated rats received the vehicle 0.5% Carboxy Methyl Cellulose (CMC), Group II were STZ induced diabetic rats, Groups III and IV were STZ induced diabetic rats administered with glibenclamide (0.25mg/kg) and *Melia azedarach* L (200mg/kg) flower extract respectively. All the test drugs were administered orally once daily for 15 days by suspending in 0.5% CMC. During the treatment, blood sugar levels were measured by collecting the blood from tail vein at various time intervals.

Statistical Analysis

Results were expressed as mean \pm SEM. The data were analyzed by using one way analysis of variance (ANOVA) followed by Dunnet's t test using GraphPad version 3. P values < 0.05 were considered as significant.

Table 1. The antidiabetic activity of ethanolic flower extract of *Melia azedarach* L against STZ induced diabetic in rats.

Groups	Drug Treatment	Blood Sugar Level (mg/dl)			
		0 Day	5 th Day	10 th Day	15 th Day
I	Normal Control 0.5% CMC	103.40 \pm	105.00 \pm	103.50 \pm	100.13 \pm
		5.31***	7.50***	8.07***	7.81***
II	Diabetic Control STZ (60mg/kg)	223.70 \pm	242.29 \pm	262.73 \pm	261.77 \pm
		7.44	7.33	8.34	8.62
III	Diabetic + <i>Melia azedarach</i> L (200mg/kg)	234.52 \pm	193.37 \pm	151.60 \pm	124.42 \pm
		7.84	8.13**	7.66***	6.60***
IV	Diabetic +Reference Control Glibenclamide (0.25mg/kg)	237.20 \pm	181.55 \pm	134.74 \pm	104.56 \pm
		6.74	6.54***	7.50***	6.90***

Values are in Mean \pm SEM; (n = 6); *P < 0.05, **P < 0.01, *** P < 0.001 Vs Control.

RESULT & DISCUSSION

Table 1, illustrates the effect of *Melia Azedarach* L on blood sugar levels of STZ induced diabetes in rats.

Administration of STZ (60mg/kg) produced diabetes in the rats which was confirmed by the elevation of blood sugar levels. The diabetic animals were treated with ethanolic



flower extract of *Melia Azedarach* L and glibenclamide by oral administration for 15 days. The mean blood sugar levels were measured during the test drug administration on 0, 5th, 10th and 15th day. In the groups treated with *Melia Azedarach* L there was a significant decrease in blood sugar levels to 193.37±8.13 (P<0.01) on 5th day, 151.60±7.66 (P<0.001) and 124.42±6.60 (P<0.001) on 10th and 15th day respectively. The reference control Glibenclamide also significantly (P<0.001) reduced the blood sugar levels to 181.55±6.54, 134.74±7.50 and 104.56±6.90 on 5th, 10th and 15th day respectively.

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CONCLUSION

The antidiabetic activity of ethanolic flower extract of *Melia Azedarach* L (200mg/kg) was studied against streptozosin induced diabetes in rats. From the above results it was concluded that, *Melia Azedarach* L flower extract, exhibited the antidiabetic activity against the STZ induced diabetes in rats by decreasing the elevated blood sugar levels. Further study is require on the active principal present in *Melia Azedarach* L flower, which is responsible for its antidiabetic activity.

