

Research Article

Antidiabetic Potential of Aqueous and Ethanol Leaf Extracts of *Vitex negundo*.

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ABSTRACT

The traditional system of the medicine remains the major source of the health care. It is safe alternative, lesser cost and better tolerance and its complications. Aqueous and ethanol leaf extract of *Vitex negundo* was studied for its antidiabetic activity using alloxan induced diabetic model in rats. The aqueous extract showed ($P < 0.01$) significant activity than the ethanol extract at the tested dose level, which were comparable to glibenclamide, a standard antidiabetic drug.

KEY WORDS: Alloxan, Antidiabetic, Leaf extracts, *Vitex negundo*.

INTRODUCTION:

Diabetes mellitus is a rapid growing metabolic disorder affecting approximately 171 million disorders in the year 2000 and this is projected to increase to 366 million by 2030^[1]. Diabetes is a condition primarily defined by the level of hyperglycemic giving rise to risk of micro vascular damage (retinopathy, nephropathy and neuropathy), significant morbidity due to specific diabetes related macrovascular complication (Ischemia heart disease, stroke and peripheral vascular disease), and diminished eminence of life^[2]. In spite of the introduction of hypoglycemic agents, diabetes and related complications continued to be a major medicinal problem. Since time immemorial, patients with non-insulin requiring diabetes have been treated orally in folk medicine with a variety of plant extracts. The treatment aimed not only decreasing the blood sugar level to normal limits, but also at correcting the metabolism in ancient literature for the cure of diabetes condition and its related complications^[3].

Vitex negundo belonging to family *Verbenaceae* is a large aromatic shrub distributed throughout the greater part of India up to an altitude of 1500 meter in the Himalayas. The shrub is very common in many part of the country and often occurs gregariously. It is abundant along the banks, rivers in moist situations, and open waste lands. It is widely planted as hedge plant along the roads and between fields. The shrub can be reproduces readily from cutting and as it produces roots, suckers it is useful for planting against soil erosion. The traditional systems of Siddha and Ayurvedic medicine use this plant alone or in combination with other medicinal plants for the treatment

of various diseases. It contains various chemical classes such as alkaloids, tannins, flavanoids, and carbohydrates. Traditionally, it is having the folk claims like useful in treatment of antimicrobial, anticancer, insecticidal, rheumatism, tranquilizer, tonic, febrifuge, expectorant and diuretic properties. Almost all parts of the herb are useful as a drug but the leaves, bark and roots are most important and sold as drugs. The decoction of leaves is considered as tonic, vermifuge and is given along with long pepper in catarrhal fever. Leaves of this plant have been shown mosquito repellent effects as well as antiulcerogenic, antiparasitic, antimicrobial and hepatoprotective potentials^[4]. The plant has anti-inflammatory^[5], antibacterial^[6], antifungal^[7,8] and analgesic activities. These properties are useful in the treatment of superficial bruises, injuries, sores and skin infections^[9]. According to the present investigation is an attempt to assess the bioactivity of aqueous and ethanol extract of *Vitex negundo* leaf in experimental diabetes in rats.

MATERIALS AND METHODS

Collection of medicinal plant: Fresh leaves of *Vitex negundo* were collected from Palluru Village at Chittoor District, A.P. The plant was identified by local people of that village and authenticated by Dr. P. Jayaraman, Director, Plant Anatomy Research Centre (PARC), Chennai. A herbarium specimen of the plant (APCP-1/201) was preserved in the Department of Pharmacognosy of our institute for further reference.

Procurement of animals: Adult *wistar albino* rats of either sex maintained under standard condition (temperature: 23

Table 1: Effect of *Vitex negundo* leaf aqueous and ethanol extract on blood glucose, body weight and urine sugars in diabetes rats.

Groups	Blood glucose (mg/dl)	Body weight (g)		Urine sugar
		Initial weight (g)	Final weight (g)	
Normal	82.4±3.3	182.3±0.4	194.6±0.2	Nil
Alloxan induced Diabetic rats	226.2±1.3	184.6±0.8	142.0±0.6	+++
Glibenclamide treated diabetes	83.2±1.3**	179.2±0.3	178.2±1.3**	Nil
Aqueous extract of <i>Vitex negundo</i> treated diabetes	102.2±1.3**	181.4±0.3	184.2±0.3**	Nil
Ethanol extract of <i>Vitex negundo</i> treated diabetes	116.2±1.3*	184.2±0.3	185.2±1.3*	Nil

+++ indicates more than 2% sugar; Values are expressed as mean ± SD for six animals in each group; *P < 0.05 and ** P < 0.01 significantly different compared with Standard Glibenclamide treated diabetes.

± 2°C, relative humidity: 55 ± 10% and 12h light and dark place) were used for pharmacological study. The animals were allowed standard laboratory feed and water *ad libitum* (Amrut lab animals feed, sanli-141643). Ethical clearance for performing the experiments on animals was obtained (Reg. No. - 409/ 2001/ CPCSEA) from the Institutional Animal Ethics Committee. Alloxan was obtained from SD Fine Chemicals Pvt Ltd., Mumbai. All other chemicals and solvents used for this study were of analytical grade.

Preparation of aqueous and ethanol extract: Fresh leaves of *Vitex negundo* were washed, shade dried, powdered, and passed through a #60 mesh sieve. The aqueous extract was prepared by maceration in chloroform water. The macerate was filtered through Whatmann No.1 filter paper and concentrated in a rotary flash evaporator at a temperature not exceeding 50°C. The ethanol extract was prepared by defatting with petroleum ether (60-80°C) and then extracted in a soxhlet apparatus by continuous heat extraction with ethanol (95%v/v). The extract was concentrated in a rotary flash evaporator at a temperature not exceeding 50°C.

Screening Of Antidiabetic Activity: [10] The 30 rats were divided into five groups each group in six rats.

Group 1: Normal rats received 0.5 ml of physiological saline.

Group 2: Alloxan induced diabetic rats.

Group 3: Alloxan induced diabetic rats were given orally with 10 mg/kg of glibenclamide.

Group 4: Alloxan induced diabetic rats were given orally aqueous extract of *Vitex negundo* in 500 mg /kg of body weight, once every day up to 6 weeks.

Group 5: Alloxan induced diabetic rats were given orally ethanol extract of *Vitex negundo* in 500 mg /kg of body weight, once every day up to 6 weeks.

Sample collection: During the second, fourth, and sixth week of treatment, the body weight, urine sugar and blood glucose of all the rats were determined. At end of the 6th week the animals were deprived of food overnight and sacrificed by decapitation. Fasting blood samples (0.5 ml) were collected from rat tail vein under mild anesthesia condition.

STATISTICAL ANALYSIS

The results were expressed as Mean ± SEM .The data was analyzed by one-way ANOVA followed by Dunnet's test to find out the level of significance was expressed as P<0.01 and P<0.05.

RESULT

Table 1 show that the blood glucose and urine glucose level were significantly higher and animal body weight was decreased in diabetic untreated rats as compared to normal rats. The oral administration of aqueous and ethanol extract of *Vitex negundo* decreases the elevated blood glucose level and urine sugar was nil. The body weight return to normal as compared to diabetic rats.

DISCUSSION

The diabetic rats showed the elevated level of blood glucose to confirm the abnormality of glucose metabolism and also cause a massive reduction of the β - cells of the islets of langerhans and induce hyperglycemia^[11, 12]. Dehydration and loss of body weight have been associated with diabetic rats, the decreased body weight and loss of body weight due to excessive break down of tissue protein and protein wasting due to unavailability of carbohydrates as an energy source^[13].

The present study reveals that both the aqueous and ethanol extracts of *Vitex negundo* leaf exhibited significant reduction in blood glucose levels at the dose 500mg/kg body weight, when compared to standard drug glibenclamide 10mg/kg body weight (Table 1). Administration of aqueous and ethanol extract of *Vitex negundo* leaf significantly (P<0.01) improved the body weight in diabetic rats.

CONCLUSION

In conclusion the aqueous and ethanol extract of *Vitex negundo* leaf was found to exhibit a signifying hypoglycemic activity in alloxan induced diabetic rats. When compare the both extract activity, aqueous extract has shown significant effect than ethanol extract. Further studies are needed to isolate and characterize the bioactivity compounds of antidiabetic from *Vitex negundo* leaf medicinal plant.

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