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Hypoglycemic, Antidiabetic and Antiulcer Screening of *Thespesia Populnea* Linn.

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Abstract – In the present study, *Thespesia populnea* was extracted with alcohol and water. The extracts were vacuum dried to yield the respective alcoholic and aqueous extracts. The extracts were screened for hypoglycemic, antidiabetic and antiulcer activities at the dose level of 500 mg/kg by standard methods. The extracts exhibited significant response for antidiabetic and antiulcer activities. The present study proved the claims of *Thespesia populnea* mentioned in the Indian System of Medicine.
Keywords – Hypoglycemic, antidiabetic, antiulcer, *Thespesia populnea*

Introduction

Thespesia populnea is a common plant found in India. It is known as Puvarasu in Tamil (Kirtikar K.R and Basu B.D, 1987). In siddha system, it is being considered useful for treating seborrhoea, stomach ache, vitiligo, skin disorders and depurative (Yoganarasimhan S.N, 2000). The plant has also been claimed to posses antidysentry, antidiabetes, antiulcer and diuretic (V.V Sivarajan, 1994. Vaidyaratnam P.S Varier, 1996). The leaves are used as anti- inflammatory and antibacterial (The Wealth of India, 1989). Flowers, Fruits and Leaves are used in scabies, psoriasis and other skin diseases.

The presence of active constituents viz. Glycosides, Terpenoids, Quinones, Flavonoids and Sterols have been reported from the plant (Asima chatterjee and Satyesh C.P., 1992). Since no scientific proof about antidiabetic and antiulcer activities of *Thespesia populnea,* an attempt has been made to explore such activities for *Thespesia populnea.* In the present work, vacuum dried alcoholic and aqueous extracts were evaluated for hypoglycemic, antidiabetic (alloxan induced model) and antiulcer activities (Pylorus ligation model).

Materials and Methods

Plant material – The plant material, *Thespesia populnea* was collected from Salem District, South India and it was authenticated by Dr. Jayaraman, Director, Plant Anatomy Research Centre, Chennai.

Extraction – Air dried coarsely powdered plant material was extracted with alcohol and water for 48 hours by maceration. Thus obtained alcoholic and aqueous extracts were filtered and vacuum dried using vacuum flash evaporator to yield the solid residue of 8.8% and 17.5% respectively.

Animals – Inbred wistar albino rats of either sex (150-180 gm) were used for the evaluation of pharmacological activities. They were kept in colony cages at 25±2°C, relative humidity 45-55% maintained under 12 hours light and dark cycle (0600-1800 h-light; 1800-0600 h-dark). All the animals were acclimatized for a week before use. They were fed with standard animal feed (Hindustan Lever Limited) and water *ad libitum.* Acute toxicity study was performed for the extracts to ascertain the safe dose by acute oral toxic class method of Organization of Economic Co-operation and Development, asper 423 guide lines (OECD) (Donald. J.Ecobichon, 1997). The aqueous and alcoholic extracts were administered at the dose level of 500 mg/kg.

Both the test and the standard drugs were administered in the form of suspension using 0.1% carboxy methyl cellulose as vehicle.

Hypoglycemic activity – Hypoglycemic activity (Porchezhian, *et al.*, 2000) was determined by using normal rats. Wistar albino rats (150-180 gms) of either sex were selected by random sampling technique. They were fasted overnight. Phenformin was served as standard at a dose level of 600 mg/kg. The extracts at a dose level of 500

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Table 1. Hypoglycemic activity of Thespesia populnea plant extracts in normal rat

Treatment	Dose mg/kg	Blood glucose (mg/dl)				
		0 hour	1 hour	2 hour	3 hour	6 hour
Alcoholic Exract	500	69.0 ±2.07	66.35±1.91	63.66±2.05	63.83±2.14	68.33±2.13
Aqueous Extract	500	65.83±1.35	63.0 ±1.59	60.66±1.31	60.0 ±1.65	63.83±2.14
Phenformin	600	65.66±1.63	62.33±1.38	58.66±1.54	61.83±1.71	63.66±1.48
Control (CMC)	0.1%	69.66±2.71	67.66±2.48	67.00±2.29	66.33±2.28	67.16±2.09

CMC-- Carboxy methyl cellulose.

mg/kg were administered orally by gavage. Blood sample was collected from tail vein and blood glucose level was determined by using one touch basic glucose test strips (Porchezhian, *et al.*, 2000). The results are presented in Table 1.

Antidiabetic activity – The antidiabetic activity was determined by alloxan induced diabetic method (Porchezhian, *et al.*, 2000). Wistar albino rats of (150-180 gms) either sex were fasted for overnight. Hyperglycemia was induced by single intraperitoneal injection of alloxan monohydrate (150 mg/kg) (Ghosh, 1984) obtained from Loba Chemie Indoaustranal Co., Bombay, India. Hyperglycemia was confirmed after 48 hours of alloxan injection. The animals were selected by random sampling technique. Phenformin (600 mg/kg) was administered orally by standard drug. The aqueous and alcoholic extracts at the does level of 500 mg/kg were administered orally by gavage. Blood sample was collected from tail vein and the determination of blood glucose level was done by using one touch basic glucose test strips (Porchezhian, *et al.*, 2000). The data of antidiabetic activity are presented in Table 2.

Anti-ulcer activity – The anti-ulcer activity was determined by Pylorus ligation method (Kulkarni S.K, 1999). Animals were fasted for 48 hours prior to ligation with access to water *ad libitum* with 8% dextrose and 0.2% sodium chloride (Kokue, *et al.*, 1974). Ulcer was induced by ligation. After inducing the ligation, the test extracts and standard drug, Ranitidine were administered at the dose of 500 mg/kg and 20 mg/kg respectively, (Divakar, *et al.*, 2001). The ulcer was scored and expressed as ulcer index. Free acidity and total acidity were determined for gastric content and expressed in milliequivalent 1/100 gm (Kulkarni S.K, 1999). The antiulcer results are presented in Table 3.

Statistical analysis – All data were expressed as mean ± SEM and unpaired student t test (Spiegel and Meddis, 1980) was used for statistical analysis.

Results and Discussion

The aqueous and alcoholic extracts were given orally at the dose level of 500 mg/kg.

It was found that the alcoholic and aqueous extracts of plant (500 mg/kg) did not reduce the blood glucose level in normal rats. Nevertheless they exhibited significant decrease in alloxan induced diabetic rats. The alcoholic extract reduced blood glucose from 257 mg/dl to 69.83 after 6 hours of drug administration (0 hour-6 hour), whereas

Table 2. Hypoglycemic activity of Thespesia populnea plant extracts in Diabetic rats

Treatment	Dose mg/kg	Blood glucose (mg/dl)				
		0 hour	1 hour	2 hour	3 hour	6 hour
Alcoholic Exract	500	257.16±1.96	202.5±2.66*	136.50±2.84*	76.5±2.22*	69.83±2.04*
Aqueous Extract	500	252.83±2.57	201.13±2.19*	138.50±1.63*	81.66±1.28*	77.16±1.33*
Phenformin	600	247.50±2.02	185.50±1.48*	129.17±3.40*	65.33±2.19*	66.33±3.07*
Control (CMC)	0.1%	249.50±2.08	253.33±1.93	257.17±2.46	262.16±2.45	270.5±2.70

Siginificance level: *P<0.05 compared to control.

Table 3. Anti ulcer activity of Thespesia populnea plant extracts

Treatment	Dose	Gastric fluid Volume in ml	PH	Free acidity MEq/1/100 g	Total acidity MEq/1/100 mg	Ulcer Index
Alcoholic Exract	500 mg/kg	5.81±0.24*	4.38±0.05	30.09±0.63*	48.28±0.43*	2.33±0.16*
Aqueous Extract	500 mg/kg	5.90±0.61*	4.20±0.03	35.36±1.26*	52.19±1.68*	2.75±0.21*
Phenformin	20 mg/kg	5.73±0.20*	4.40±0.08	29.41±1.5*	48.11±1.53*	2.16±0.10*
Control (CMC)	0.1%	8.98±0.20	2.65±0.08	61.88±0.86	86.02±1.28	4.16±0.24

Siginificance level: *P<0.05 compared to control.

aqueous extract reduced to 77.16 mg/dl. Phenformin, a biguanide derivative, was served as standard and it has produced little hypoglycemic activity in non-diabetic animals (Tripathi, K.D., 1999).Since the extracts of the plant produced similar actions, they may be considered to possess a biguanide like activity.

The extracts also exhibited antiulcer activity at experimental dose levels. Alcoholic extract produced ulcer index 2.33 after 24 hours of pylorus ligation, whereas aqueous extract produced 2.75. Ranitidine was used as standard for screening antiulcer activity. Both of the extracts were as effective as Ranitidine, thereby indicating antiulcer activity. Several Flavonoids have shown antiulcer properties in different experimental models (Raj Narayana K., *et al.*, 2001).

In conclusion, the alcoholic extract of Thespesia populnea showed better antidiabetic and antiulcer activities than aqueous extract. These activities of the extracts may be due to the presence of Terpenoids, Flavonoids and Quinones, which were confirmed by chemical test. So, the present study unambiguously confirms the early claiming of antidiabetic and antiulcer activities of Thespesia populnea.

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