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Anti-Hyperglycemic Activity of *Thespesia populnea* Bark Extracts in Alloxan Induced Diabetic Rats

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ABSTRACT

Thespesia populnea is a reputed ever green tree belonging to the family malvaceae; commonly known as Indian tulip tree. The plant is distributed in tropical regions and coastal forest in India. It is well known and all the parts are used in Indian system of medicine. The ethanol extract of *thespesia populnea* bark exhibited significant anti hyperglycemic activity in alloxan induced diabetic rats. The bark extract of *thespesia populnea* has potent anti-hyperglycemic property compared to standard glibenclamide. The alloxan induced diabetic rats showed significant increase in the level of blood sugar. Oral administration of ethanol extract of *thespesia populnea* bark at a dose 200and 400 mg/kg/p.o showed significant (P< 0.05) reduction in blood glucose level after2,4,6 and 8 hrs interval in diabetic rats, but it explore the maximum reduction in blood glucose level after 6 hrs. Glibenclamide (0.5mg/kg, p.o.) also showed maximum reduction after 6 h.

Keywords: Diabetes mellitus,Alloxan and *Thespesia populnea.*

1. INTRODUCTION

Diabetic mellitus (DM) is the condition arising due to abnormal metabolism of carbohydrate, proteins and fats. It is caused by insulin deficiency often combined with insulin resistance [1]. The total number of people with diabetes is predicted to rise to about 300 million by 2025, with one-third of affected individuals living in India and China alone. The World Health Organization has estimated that 80% of the world's population use botanical medicine for their primary healthcare needs [2-4]. *Thespesia populnea* is a common plant found in india. All the parts of the plant used in traditional system of medicine. The bark, leaves, flower and fruits are useful in cutaneous infection such as scabies, psoriasis, eczema, ringworm, and guinea worm. The decoction of the bark is commonly used for the treatment of skin and liver diseases. A compound oil of bark and capsules is useful in urethritis and gonorrhea. The bark, root, fruits were used in dysentery, cholera and hemorrhoids [5]. The phytochemical study of bark revels the presence of gossypol, tannin, and colouring matter and leaf extract indicate the presence of lupeol, lupenone, β-sistosterol and also acacetin, quercetin, vanilic, syringic, melitoc and ferulic acid [6] .The fruits of the plant are used in ayurveda for the control ofdiabetes [7]. Hence in present study, the ethanolic extract of *thespesia populnea* bark was investigated for hypoglycemic effect in alloxan induced diabetic model.

2. MATERIALS AND METHODS

2.1. Plant material

The fresh bark of *thespesia populnea* was collected from nalgonda district. The plant has been authenticated by Mrs. Sujatha, head of the department of Botany, New Bhavan's college, Hyderabad, Andrapradesh.

2.2. Preparation of plant extract

The freshly collected bark were dried under shade, cut in small pieces and made into coarsely powder using mechanical grinder and preserved in airtight container. The powdered barks were extracted separately by percolation at room temperature with 95% ethanol. The ethanolic extracts were collected and filtered. The extract were concentrated under reduced pressure and dried in vacuum desiccators. A brownish black colored residue was obtained from bark (Yield16.5%w/w) which was kept in a desiccators. This ethanolic extracts of *Thespesia populnea* bark (TPBE) and leaf (TPLE) were suspended in 1%SCMC and used for the experiments

2.3. Preliminary phytochemical screening

The extracts were preliminary investigated for various phytochemical constituents such as alkaloids, Carbohydrates,

Steroids, Proteins, Phenols, Tannins, Flavonoids, Glycosides, Gums, Saponins and terpenes [7].

2.4. Acute toxicity studies:

Acute oral toxicity study was performed as per OECD-423 guidelines (acute toxic class method). wistar rats (n=6) of either sex selected by random sampling techniques were employed in this study. The animal were kept fasting for overnight providing only water. Then the extracts (bark) were administered orally at the dose of 2000 mg/kg by intragastric tube and observed for2 days for the gross behavioral changes and mortality.

2.5. Experimental Induction of diabetes

After fasting for 18hrs 30 rats were injected by intraperitoneally with a single dose of 150 mg/kg

alloxan after dissolving it in 0.9% normal saline. After the injection they had free access to feed and water and were given 5% glucose solution to drink over night to counter the hypoglycemic shock. The development of diabetes was confirmed after48hrs of the alloxan injection. The animal having fasting blood glucose levels more than 200mg/dl were selected for the experimentation [8].

2.6. Experimental Protocol

The experiment involved testing for anti-hyperglycemic effect of the plant extracts after single oral administration in diabetic rats.

Group I- Normal control received the 0.5% carboxyl methyl cellulose (1ml/kg,p.o)

Group II- alloxan induced diabetic animal received the distilled water (5ml/kg,p.o)

Groups III- alloxan induced diabetic animal received the glibenclamide (0.5mg/kg p.o.),

Group IV- alloxan induced diabetic animal received the EETP (200mg/kg p.o.),

Groups V- alloxan induced diabetic animal received the EETP (400mg/kg p.o.),

Anti-hyperglycemic activity involved withdrawal of blood at 0, 2, 4, 6, 8 and 24 h after administration of standard drug and extracts.

2.7. Statistical analysis

The results are expressed as Mean ± SEM. comparison between the groups was made by analysis of variance (ANOVA), followed by tukey's, multiple comparisons test. P value P <0.05 was considered as significant.

3. RESULT AND DISCUSSION

The preliminary phytochemical studies indicated the presence of carbohydrate, protein, tannins, phenol, flavonoids, terpenes, Saponins and gums in the ethanolic extract of the bark. In acute toxicity study, the ethanolic extract of *Thespesia populnea* bark and leaf did not produced lethality up to the dose level of 2000 mg/kg. Alloxan induced diabetic rats showed significant increase the blood sugar level. EETP 200 &400mg/kg treated diabetic rats, showed reduction in blood glucose level after 2, 4, 6 and 8 h interval. EETP 200& 400mg/kg showed maximum reduction in blood glucose level after 6 h. Glibenclamide (0.5mg/kg, p.o.) also showed maximum reduction after 6 h [Table 1and fig. 1]

Table No -1: Effect of single dose of EETP and standard hypoglycemic drug glibenclamide on blood glucose levels in alloxan induced diabetic rats.

Treatment design.	Blood glucose level in mg/dl at different time interval					
	0h	2h	4h	6h	8h	24h
Group–I Normal Control	83.83±2.13	73.67±2.2	72.67±1.5	79.83±2.9	89.5±3.0	84.67±2.9
Group–II Negative Control (Alloxan)	294.2±3.7^{c}	304.5±9.1^{c}	313±4.8^{c}	306.5±13.6^{c}	317.2±13.2^{c}	321±4.4^{c}
Group–III Positive Control (Glibenclamide)	294.2±3.7^{c,d}	264.3±3.8^{c,f}	220±2.0^{c,f}	165.8±5.1^{c,f}	243±4.85^{c,f}	287±5.0^{c,f}
Group–IV EETP 200 mg/kg	309.5±5.3^{c,f,i}	265±5.5^{c,f,g}	188.3±6.7^{c,f,i}	164.2±3.76^{c,f,g}	222.8±4.07^{c,f,g}	328.7±3.3^{c,d,i}
Group –V EETP 400 mg/kg	304.8±4.7^{c,e,h}	254±5.8^{c,f,g}	184.2±3.7^{c,f,i}	136.2±2.48^{c,f,i}	215.7±4.03^{c,f,g}	303.8±3.6^{c,f,i}

Values are expressed as mean ± SEM of 6 animals. Symbol represents the statistical significance done by ANOVA, followed by Tukey's multiple comparison tests.

[a]P<0.05,[b]P<0.01,[c]P<0.001, indicates the comparison of all groups with control group.

[d]P<0.05,[e]P<0.01,[f]P<0.001, indicates the comparison positive control, EETP 200 & 400 mg/kg with negative control group

[g]P<0.05,[h]P<0.01,[i]P<0.001, indicates the comparison of EETP 200 and 400 mg/kg with positive control group.

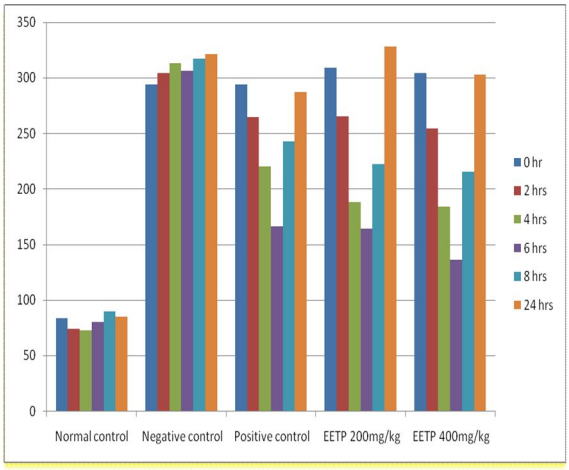

Figure 1: EETP and Glibenclamide on blood glucose levels in alloxan induced diabetic rats.

4. CONCLUSION

The ethanolic extract of *Thespesia populnea* bark and exhibited significant anti-hyperglycemic activity in alloxan induced diabetic rats. This extracts may be show the effect due to enhancing effect on cellular antioxidant defenses to protect against oxidative damage. Present efforts are directed to isolate active constituent from the plant extract and confirmation of mechanism of action

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