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Preliminary Phytochemical and Hypoglycemic Activity of Leaves of *Grewia Asiatica* L.

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ABSTRACT

The present study involves screening of different extract of leaves of *Grewia asiatica,* for hypoglycemic activity on alloxan induced diabetic Wister rats using glibenclamide as standard. Ethanol extracts (200mg/kg b.w. p.o.) shown more significant (p<0.01) reduction in blood glucose level in alloxan induced diabetic Wister rats compared to control and glibenclamide as standard (10 mg/kg b.w. p.o.). And all extracts also screen for phytochemical study revealed presence of Triterpenoids, Alkaloids, Flavonoids, Sterols, Tannins, and Fats as principal chemical constituent.

Keywords: alloxan, *Grewia asiatica*, hypoglycemic, Triterpenoids.

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INTRODUCTION

Diabetes mellitus is a clinical syndrome characterized by inappropriate hyperglycaemia caused by a relative or absolute deficiency of insulin or by a resistance to the action of insulin at the cellular level. It is the most common endocrine disorder, affecting 16 million individuals in the United States and as many as 200 million worldwide. Diabetes has been a clinical model for general medicine. The primary defect in fuel metabolism results in widespread, multi-organ complications that ultimately encompass virtually every system of the body and every specialty of medicine. It has been said that to know diabetes is to know medicine and health care. Although from a clinical standpoint this may be true, our increasing knowledge of the pathophysiology of the syndrome, together with the mechanisms of long- term complications, has placed diabetes research at the frontier of immunology and molecular biology [1]. Diabetes mellitus has been known since ages and the sweetness of diabetic urine has been mentioned in Ayurveda by Sushruta. Its pharmacotherapy however is over 80 years old. The word diabetes was coined by the Greek physician Aeretaeus in the first century. In the 17th century, Willis observed that the urine of diabetics as wonderfully sweet as if imbued with honey or sugar. The presence of sugar in the urine of diabetics was demonstrated by Dobson in 1755. [2]

Diabetes is a chronic disease affecting around 2-3 % of the population worldwide. Unfortunately, after the introduction of sulfonylurea and metformin about 50 years back no major lead has been obtained in this direction of finding a proper drug for diabetes. Plant materials which are being used as traditional medicine for the treatment of diabetes are considered one of the good sources for a new drug or a lead to make a new drug. Plant extract or different folk plant preparations are being prescribed by the traditional practioners and also accepted by the users for diabetes like for any other diseases in many countries especially in third world countries. Now-a days more than 400 plants are being used in different forms for hypoglycaemic effects all the claims practitioners or users are neither baseless nor absolutely. Therefore, a proper scientific evaluation a screening of plant by pharmacological tests followed by chemical investigations is necessary [3,4]. Leaves of *Grewia asiatica L.* (Tiliaceae) are useful in elephantiasis, inflammations, leprosy, leucoderma, diabetes fever, diarrhea, gout, rheumatoid arthritis and bronchitis [5].

Ayurveda and other traditional system of medicine supports leaves of *G. asiatica* as anti-diabetic, which are efficacious and economical, as compared to synthetic drugs, but not evaluated systematically till date. Hence, the present study was aimed towards the screening of leaves of *G. asiatica* for hypoglycemic activity by using alloxan induced diabetic model.

MATERIALS AND METHOD

Plant Material

The leaves of *Grewia asiatica* Linn. were collected from Satpuda hills, Dist-Nandurbar. (Maharashtra) and authenticated at Botanical survey of India. The authentication certificate no. is –BSI/WC/Tech/2009/202.

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Plant Extractions

Collected leaves were dried and crushed to coarse powder. Powdered material was charged into soxhlet apparatus and continuous hot extraction was carried out using solvents like petroleum ether, chloroform and ethanol successively [6].

Preliminary Phytochemical Screening

Preliminary phytochemical screening of extracts was carried out to know the different constituents present in it as per the methods described by Harborne J.B.1998. The extracts were tested for alkaloids, triterpenoids, sterols, glycosides, phenolic compounds, flavonoids, carbohydrates, saponins and fats [7,8].

Evaluations of Hypoglycemic Activity

Animal selection

Healthy adult Wister rats of either sex weighing 150-180 g were selected for the study. The study was carried in accordance with the rules and regulations laid by the Institutional Animal Ethics Committee. The animals were housed with free access to food and water. The basal food intake and body weights to the nearest gram were noted. Rats were starved 24 hr prior to the study. Individual extract of leaves of *G. asiatica* were evaluated in six groups of six animals each.

Experimental Protocol

The experimental induction of diabetes was carried out in rat by administration of alloxan (120 mg/kg, i.p.), which was freshly dissolved in sterile normal saline. After administration of alloxan, 5% glucose solution was supplied in water to prevent transient hypoglycaemic. The fasting serum glucose levels were determined by using glucometer[9]. Rat with a serum glucose level above 200mg/dL were selected for the experiment. The animals were grouped as follows with six animals in each group. Group I Normal control Group II Diabetic control with single dose of (120 mg/kg, i.p.) alloxan Group III Standard with daily dose of (10 mg/kg, p.o.) glibenclamide. Group IV , V and VI received petroleum ether, chloroform and ethanol extract of G. asiatica (200mg/kg/day, p.o.) respectively for 7 days. For acute study, 0.2 ml of blood sample was withdrawn through the tail vein puncture technique using hypodermic needle and blood glucose level were determined by using glucometer at interval of of 0, 1^{st}, 2^{nd}, 3^{rd}, 5^{th} and 7^{th}h of administration of single oral dose and for sub acute study blood glucose levels were determined at 1^{st}, 2^{nd}, 3^{rd}, 5^{th} and 7^{th} day of Study [10-12].

Statistical Analysis

One way analysis of variance (ANOVA) followed by Dunnett's *t*-test, was carried out and $P<0.01$ was considered as significant [13].

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RESULT AND DISCUSSION

The Preliminary phytochemical study performed revealed the petroleum ether extract consist diterpines, glycosides, fats, chloroform extract consist alkaloids, glycosides and Ethanol extract consist triterpenoids, sterols flavonoids, saponins, tannins as active principal. In Evaluations of hypoglycemic activity in acute as well sub acute study Ethanolic extract showed significant decrease in serum glucose level, while petroleum ether and chloroform extract did not show significant decrease in serum glucose level as compared to standard drug (Glibenclamide). The results are given in Table 1 and 2.

CONCLUSION

The present study involves screening of different extract of leaves *Grewia asiatica,* for hypoglycaemic activity on alloxan induced diabetic Wister rats using glibenclamide as standard. The *in vivo* study demonstrated significant hypoglycaemic activity was found highest in ethanolic extract of *Grewia asiatica.*

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Table 1: Effect of the Extracts of *Grewia asiatica Leaves* on blood glucose of alloxan diabetic albino rats after acute treatment

Group (n)	Serum Glucose Level (mg/dL) (Mean ± SEM)					
	0 h	1 h	2 h	3 h	5 h	7 h
Normal	138.25 ± 5.45	139.75 ± 5.58	138.25 ± 4.58	139.56 ± 4.57	137.56 ± 4.5	139.75 ± 3.12
Control (diabetic)	220.45 ± 6.88	221.34 ± 5.78	223.43 ± 5.84	224.65 ± 2.82	225 ± 5.83	227.3 ± 5.94
Standard (10mg/kg)	221.07 ± 5.95	217.22 ± 4.69	211.07 ± 4.70	*208 ± 2.71	*205.77 ± 4.01	**201.08 ± 6.31
Pet. Ether (200mg/kg)	224.54 ± 4.36	223.77 ± 4.21	220 ± 4.19	218.44 ± 2.51	217.65 ± 4.70	216.05 ± 5.75
Chloroform (200mg/kg)	223.66 ± 5.91	220.53 ± 4.08	219.35 ± 5.04	217.89 ± 2.62	215.38 ± 3.68	214.4 ± 4.80
Ethanol (200mg/kg)	222.08 ± 5.99	218.43 ± 5.46	214.32 ± 4.30	211.76 ± 3.56	*209.89 ± 5.19	**205.43 ± 7.1

*p<0.05 - Significant **p<0.01 - More Significant Compare to Control SEM: Standard Error Mean, n = Number of Animals (6)

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Table 2: Effect of the Extracts of *Grewia asiatica Leaves* on blood glucose of alloxan diabetic albino rats after Sub acute treatment

Group (n)	Serum Glucose Level (mg/dL) (Mean ± SEM)					
	0 day	1 day	2 day	3 day	5 day	7 day
Normal	139.25 ± 3.45	137.45 ± 5.67	139.45± 6.45	137.75±5.89	138.65 ± 3.58	139.55 ± 5.45
Control (diabetic)	220.33 ± 1.88	225 ± 5.83	226.75± 2.84	222.44 ± 2.82	214. 25± 5.85	209 ± 6.94
Standard (10mg/kg)	221 .25 ± 1.95	205.77 ± 4.09	196.25*±2.70	184.43*± 2.71	173 ** ± 6.01	162.66**±5.31
Pet. Ether (200mg/kg)	224 ± 2.36	217.65 ± 4.70	211.50 ± 3.19	209. 89±2.51	204 .75 ± 1.70	201.25 ± 6.75
Chloroform (200mg/kg)	223 .05 ± 2..91	215.38 ± 3.68	210.65 ± 2.04	206.05 ± 2.62	202 .09 ± 0.68	199.67 ± 5.80
Ethanol (200mg/kg)	222.08 ± 1.99	208.89 ± 5.91	199.25 ± 5.30	187 * ± 4.56	180.78 ** ± 3.19	172.75**±7..81

*p<0.05 - Significant **p<0.01 - More Significant Compare to Control, SEM : Standard Error Mean, n = Number of Animals(6)

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