Antidiabetic Activity of Methanolic Extract of *Indigofera Linnaei* Linn (Fabaceae)

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Abstract

The methanolic extract of dried whole plant of Indigofera linnaei Linn showed significant decrease in blood glucose level of rabbits as estimated by Folin-Wu Method. In this experiment, alloxan is used as diabetes inducing agent.

Keywords *Indigofera linnaei*, Antidiabetic activity, Folin-Wu Method, Alloxan.

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INTRODUCTION

India is a country with rich natural resources with variety of medicinal plants. In contrast to synthetic drugs, Herbal drugs enjoy the advantages of comparatively less toxic than synthetic drugs, more harmony with the biological system and affordable to all classes of people.

Diabetes mellitus is prevalent worldwide event today in the 21st century. It is one of the leading causes of mortality due to its microvascular and macrovascular complications [1]. The incidence of diabetes mellitus in our country is 2 - 3% and is found to increase in future. Pharmacological screening and clinical trials as reported by subsequent and recent workers reveal the presence of hypoglycemic activity and low toxicity in a large number of plants hitherto not reported. The plants which show significant pharmacological activity and low toxicity need extensive screening. One such plant *is Indigofera Linnaei* Linn (Fabaceae) which has been used for the present investigation.

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Indigofera Linnaei Linn (Fabaceae) is used in traditional medicine and is pharmacologically active. Various parts of the plant are useful for promoting growth of hair, chronic bronchitis, asthma, ulcers, skin diseases, in gastropathy and in epilepsy [2, 3].

Protective effect of alcoholic extract of plant was seen in experimental liver injury and histological evidence of protection against carbon-tetrachloride induced hepatotoxicity [4, 5]. In the present study, we report here the Antidiabetic activity of methanolic extract of *Indigofera Linnaei* whole plant in rabbits.

MATERIAL AND METHODS

Plant Material:
The fresh whole plant of *Indigofera Linnaei* Linn collected from in and around the campus of jntu-otri, Anantapur, Andhra Pradesh in Dec, 2009 and authenticated by Dr. Prasad Rao, department of botany, Sri Krishnadevaraya University, Anantapur. Herbarium was prepared and deposited in ethno botanical research lab, Department of botany, Sri Krishnadevaraya University, Anantapur.

Extract Preparation:
Air dried, powdered whole plant (200 g) was extracted by using sohxlet apparatus with methanol as solvent for extraction. Solvent elimination under reduced pressure afforded a solid residue (yield 5 %). Phytochemical screening gave positive tests for flavonoids, terpenoids, carbohydrates, phenolic compounds, alkaloids and glycosides. The Phytochemical studies were carried out for the extract as per Harborne.J.B and Kokate.C.K. [6, 7, 8]

Animals:
The effect of drugs was studied on 12 healthy rabbits of either sex weighing between 1.4 to 2 kg fed on commercial pellet diet and water *ad libitum*. The animals were housed in a galvanized iron cage. To all rabbits, alloxan (150 mg/kg subcutaneously) was used as a diabetes inducing agent. The animals were divided into four groups of three animals each. The dried methanolic extract of whole plant of *Indigofera Linnaei* was formulated as suspension in distilled water using Tween 80 (2 % w/v) as suspending agent, since Tween 80 has negligible effect on normal blood glucose level [9]. Dose to be administered was calculated on the basis of body weight of the animal.

Group – I: Received tween 80 (2% w/v) after attainment of permanent hyperglycemia.
Group – II: Received standard drug, Diabecon (250 mg/kg) orally after attainment of permanent hyperglycemia.
Group – III: Received extract I (150 mg/kg) orally after attainment of permanent hyperglycemia.
Group – IV: Received extract II (200 mg/kg) orally after attainment of permanent hyperglycemia.

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Sampling Method:
0.5 ml to 1 ml of blood was withdrawn from the marginal ear vein of the rabbit and transferred to vials containing few drops of 4% w/v sodium citrate. Blood glucose was estimated by Folin-Wu Method at 630 nm spectrophotometrically [10].

Statistical Analysis:
Experimental data were subjected to statistical analysis. Results are expressed as mean ± standard error (S.E.). Data were analysed by student's t-test and two-way analysis of variance (ANOVA) [10].

RESULTS AND DISCUSSION

The effect of the standard drug and methanolic extracts of *Indigofera Linnaei* on blood glucose level of rabbits when compared showed that the standard drug showed highest percent reduction in the blood glucose level.

Table1: Comparison of effects of standard drug and methanolic extracts of Indigofera Linnaei whole plant on blood glucose level

Group	Time in hours						Total % in reduction in blood glucose level	ANOVA (one way)
	0	2	4	6	8	24		
Diabetic control	318.16 (1.01)	306.41 (1.126)	302.5 (1.44)	311.08 (2.03)	304.16 (0.83)	313.83 (1.97)		
Standard [*]	338.83 (0.73)	267.0 (1.53)	232.05 (1.16)	207.11 (1.06)	174.56 (1.78)	71.59 (1.80)	78.40 (1.80)	P>0.05 NS
Extract I [*] (lower dose)	303.16 (1.59)	248.66 (1.86)	235.67 (0.88)	201.95 (1.11)	101.05 (0.39)	67.73 (2.05)	65.03 (0.61)	P>0.05 NS
Extract II [*] (higher dose)	340.0 (1.15)	218.33 (1.67)	171.0 (2.08)	142.73 (0.89)	123.78 (0.11)	112.33 (1.45)	65.10 (0.52)	P>0.05 NS
ANOVA (one-way)						p<0.01 ES		

Each value represents Mean±SEM (N=6), ES: Extremely Significant, NS: Not Significant

Table No 2: Statistical variance of analysis (ANOVA) **effects of standard drug and methanolic extracts of whole plant of *Indigofera Linnaei***

S. No	*Source of Variation*	*SS*	*df*	*MS*	*F*	*P-value*
1	Between Groups	109662	5	21932	23.209	0.0001
2	Within Groups	11340	12	944.99		
3	Total	121001	17			

Data are found to be significant by testing through one way ANOVA at 1 % level of significance (P < 0.0001).
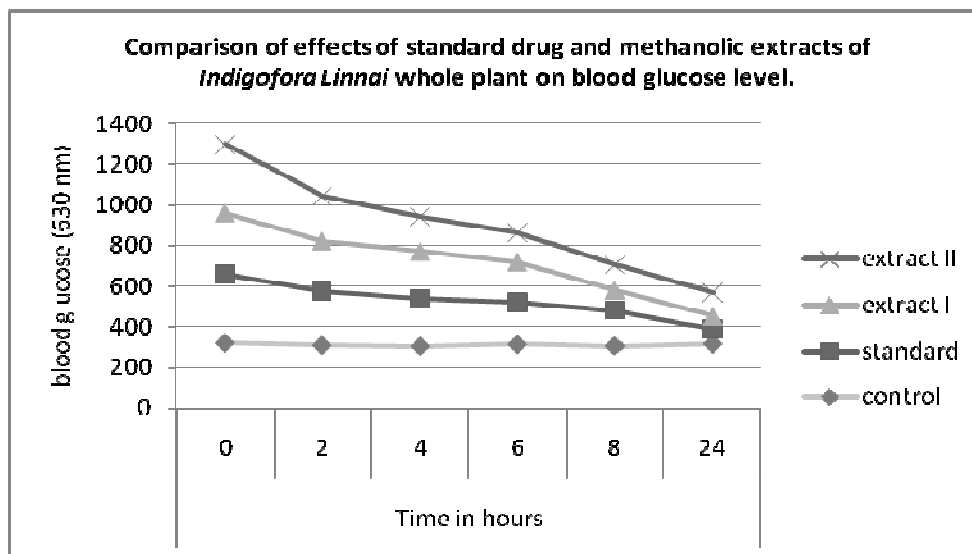
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The effect of the standard drug and methanolic extracts of *Indigofera Linnaei* on blood glucose level of rabbits when compared showed that the standard drug showed highest percent reduction in the blood glucose level. Total percent reduction in blood glucose level of the diabetes induced rabbits at different time intervals after administration of *Indigofera Linnaei* extract were considered for statistical analysis. Upon statistical evaluation (one-way analysis of variance), a significant ($p<0.01$) difference was observed in total % reduction in blood glucose between different groups of rabbits while same was not observed within the group ($p>0.05$) which indicating differ in concentration and nature of standard drug and methanolic extract.

Blood glucose level of different rabbits after administration of the extract was considered for student's t-test. The results have shown that there is a significant ($p<0.001$) difference in blood glucose level between control versus standard drug and the test (Table-1). The further substantiate extracts that *Indigofera Linnaei* Linn methanolic extracts possess significant antidiabetic activity.

CONCLUSION

The present investigation clearly reveals the importance of whole plant of *Indigofera Linnaei* as an economical antidiabetic agent. The plant bears a potential for further research to isolate antidiabetic principle.

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