

Evaluation of Antidiabetic Activity of Ethanolic Extract of *Solanum nigrum* Seed Powder

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Abstract

Diabetes mellitus is one of the most common metabolic disorders in India. It is estimated that by the year 2025, there will be 57 million people with diabetes in India. Present study is undertaken to evaluate antidiabetic activity of ethanolic extract of *Solanum nigrum* seed in experimental rats in two dosages of 250mg and 500mg compared with control and standard glibenclamide drug. After 21 days, ethanolic extract of seeds of *Solanum nigrum* showed a significant fall in blood sugar level than the standard drug. Further breakfast recipes using *Solanum nigrum* seed powder was formulated and evaluated organoleptically by 20 semi trained panels. Among the recipes banyard millet was highly acceptable.

Keywords: Antidiabetic Property, Albino Rats Study, Diabetes Mellitus, Phytochemical Screening, *Solanum nigrum* Seed

1. Introduction

Solanum nigrum seed belongs to the family Solanaceae and also known by the name black night shade. In India and many parts of the world it is widely used in conventional medicine and act as remedy against bilious disorder, inflammatory disorders, chronic side problems, fever, diarrhea, hydrophobia, cough, dropsy, painful sensations and eye disease etc. It grows widely in old fields, waste lands and road sides as well as on cultivated lands¹.

Black night shade is highly nutritious and has a rich phytochemistry which is capable to supply many proteins, vitamins, minerals and hormones. Its fruits have been used as a cure for nerves conditions by local communities of middle age². The Phytochemical studies revealed that the seed contains glyloalknoids, steroid glycosides, phenols, tannins, alkaloids and polyphenol compounds³. However studies on the nutrient content of seed extract

and its impact on human health is not yet probed⁴. So, the present study was carried out with the objectives

- to evaluate the anti-diabetic activity of ethanolic extract of *Solanum nigrum* seed in sterreptozotocin induced rats
- formulation and standardization of selected breakfast recipes using *Solanum nigrum* seed powder,
- organoleptic evaluation and compilation of nutritive value of formulated recipes using *Solanum nigrum* seed powder.

2. Materials and Methods

2.1 Processing of *Solanum nigrum* Seed

Seed of *Solanum nigrum* were obtained from the farm during the period of December to February and were washed, oven dried, powdered, sieved and used.

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2.2 Preliminary Phytochemical Analysis

Phytochemical screening was done for alkaloids, steroids, glycosides, carbohydrates flavonoids, tannins and phenols in *Solanum nigrum* seed powder.

2.3 Preparation of the Extract

The fresh *Solanum nigrum* seeds were cleaned by washing in water. The seeds were then dried in the oven. The dried seeds were reduced to a fine powder by dry grinding. The powdered sample was extracted by using ethanol.

2.4 Grouping of Experimental Animals and Supplementation

About 25 adult albino rats, weighing about 250-300g were obtained from Nandha College of Pharmacy, Kurapalayam, Erode. The animals were kept in clean and dry cages.

2.5 Experimental Protocol

A dosage of I and II in the concentration of 250mg and 500mg/Kg body weight respectively was prepared. Animals were divided into 5 groups each having 5 rats. Group I rats, received standard pellet, group II (diabetic induced) rats received normal pellet considered as reference control, Group III rats received standard drug (glibenclamide) Group IV received dosage I (250mg of Ethanolic extract of *Solanum nigrum* seed powder) and Group V received dosage II (500mg of Ethanolic extract of *Solanum nigrum* seed powder).

2.6 Blood Sampling

The blood glucose level of experimental rats were assessed and compared with standard drug of glibenclamide (2.5mg).

2.7 Formulation of Recipes

Three variety of value added breakfast recipes like ragiidli, sorghum uttapam and barnyard kolukattai were formulated incorporating with *Solanum nigrum* seed powder in various ratios. For the formulated products, organoleptic evaluation was carried out by numerical score card by using 20 semi trained panel members.

3. Results and Discussion

3.1 Phytochemical Analysis of *Solanum nigrum* Seed Powder

Quantitative analysis of *Solanum nigrum* seed powder reported to show the presence of tannin, phenol, steroid, carbohydrate, flavonoid, alkaloid and glycoside. Due to presence of these phytochemical constituents it may be beneficial to treat diabetes.

3.2 Comparison of Blood Glucose Level within the Experimental Groups

Table 1. Comparison of blood glucose level in experimental animals after supplementation

Dosage	Drug treatment				
	G ₁	G ₂	G ₃	G ₄	G ₅
Between 1 st day and 7 th day	0.32 ^{NS}	4.73 ^{**}	5.41 ^{**}	1.9 ^{NS}	13.25 ^{**}
Between 1 st day and 14 th day	0.15 ^{NS}	11.08 ^{**}	2.32 ^{NS}	2.14 ^{NS}	3.98 [*]
Between 1 st day and 21 st day	0.18 ^{NS}	17.93 ^{**}	0.48 ^{NS}	2.86 ^{NS}	4.06 [*]

G₁ - Normal control, G₂ - Reference control, G₃- Diabetic control, G₄ -dosage (1),

G₅ - dosage (2), NS - Not significant, * - 5 percent level significant, ** - 1 percent level significant.

The blood glucose levels of G₁ and G₄ did not show any significant difference between 1st and 7th day of supplementation, whereas in rats supplemented with glibenclamide and *Solanum nigrum* with 500mg/kg dosage, statistical analysis revealed significant difference at 1 percent level. In G₂, G₃ and G₅ the difference in blood glucose level between 1st and 7th day did not show any significant difference. Further statistical analysis showed significant difference between initial and 14th day in G₂ at 1 percent level and G₅ showed significant difference at 1% level. whereas G₁, G₃ and G₄ did not show any significant difference between 1st and 14th day. In G₂, G₄ and G₅ groups significant difference was noted in blood glucose level between 1st and 21st day of the supplementation. In G₂, the difference between 1st and 21st day is due to increase in blood glucose level, whereas the difference in G₄ and G₅

is due to significant decrease in blood glucose level due to the supplementation of *Solanum nigrum* extract.

3.3. Mean Acceptability Trials of Breakfast Recipes using *Solanum nigrum* Seed Powder

The mean overall acceptability score of S₁ variation of barnyard kolukattai scored maximum (Table 2) among the value added variations than ragiidli and sorghum uttapam. As percentage incorporation of *Solanum nigrum* seed powder increased there was decrease in the overall acceptability scores irrespective of the three recipes (Figure 1).

Table 2. Comparative mean scores for overall acceptability of recipes using *Solanum nigrum* seed powder

Formulated recipes	S	Variation		
		Mean ± Standard deviation		
		S ₁	S ₂	S ₃
Ragiidli	3.50±0.08	3.70±0.09	3.50±0.14	3.63±0.12
Sorghum uttapam	3.64±0.08	3.52±0.06	3.50±0.18	3.26±0.15
Barnyard kolukattai	3.74±0.15	3.90±0.03	3.74±0.04	3.81±0.07

S – Standard

S₁ – 10:0.2 (Barnyard millet: *Solanum nigrum* seed powder)

S₂ – 10:0.3 (Barnyard millet: *Solanum nigrum* seed powder)

S₃ – 10:0.4 (Barnyard millet: *Solanum nigrum* seed powder)

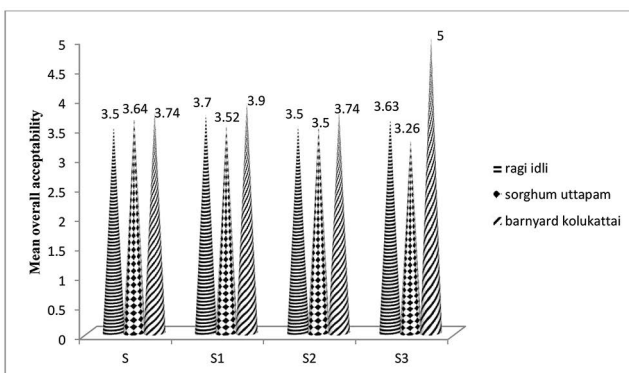


Figure 1. Comparative mean scores for overall acceptability of recipes using *Solanum nigrum* seed powder.

4. Conclusion

On the basis of the results in this study it may be stated that the ethanolic extract of *Solanum nigrum* seed powder has beneficial effects in treating diabetes mellitus with 250mg/kg in experimental rats.

5. References

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