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EFFECT OF SOLANUM NIGRUM ON LIPID METABOLISM IN DIABETIC RATS

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ABSTRACT Leaves of "Solanum nigrum" are used as an important medicinal agent and the present work is about the studies of biological role of Solanum nigrum in diabetic rats. Diabetes was induced by treating the male albino rats with single subcutaneous injection of alloxan. But the mechanism has not yet to be understood. However, it is believed that alloxan specifically disrupt β cell pancreas. The alcoholic extraction of leaves of solanum nigrum has been used to evaluate its effect against diabetes mellitus by analyzing various biochemical parameters such as SGOT, SGPT, Acid phosphatase, Alkaline Phosphatase, Lipid status etc., Interestingly after administration of Solanum nigrum to diabetic rats for a week, the values of SGOT, SGPT, Acid and Alkaline Phosphatase were reduced to reference values as in normal. The results presented in this research work clearly demonstrate that solanum nigrum has great potential against hyperglycemic effect.

KEYWORDS : Solanum nigrum – diabetic mellitus – male albino rats – alloxan.

INTRODUCTION

Diabetes mellitus is a common disease in human at various stages of life. It is chronic disorder affecting carbohydrate, fat and protein metabolism. It is a disease, which is caused by inadequate production of insulin by the body resulting in hyperglycemia or high blood glucose levels. Interestingly, about 25% of relatives of diabetics show abnormal glucose tolerance curves as compared to 1% in the general population(1). Glucose molecules are energy currency of life. Insulin secreted by the pancreas, is the key that opens the cell gates for glucose(2). If the insulin is defective the glucose gates remain shut and cell don't get the energy. The patient feels very tired. Diabetic patients exhibit a wide spectrum of deranged carbohydrate metabolism. Lake of insulin function affects not only gluscose metabolism but also fat & protein metabolism (3,4). The symptoms are polydipsia, unusual weight loss, tiredness etc., and the method used to diagnose diabetes mellitus in confirmatory (5) are blood test for glucose, oral glucose tolerance test, urine test for glucose and ketones.

Solanum nigrum belongs to the family solanaceae and it is a large genous of about 1,500 species are native to india. The plant is bitter taste, middly thermogenic, antiseptic and inflammatory. Leaf is a rich source of vitamin C, riboflavin, and nicotinic acid. Fruits contain glucose, fructose, vitamin C and β carotein.

Solanum nigrum distributed as a weed, throughout dry parts of India. The berries is useful in diseases of the heart and the eye in pains, piles, itch, asthma, dysentery, hiccough, vomiting, fever, bronchitis, urinary discharges and hydrophobia. The root bark is useful in inflammation of the liver, chronic fever and griping. The fruit is useful in thirst due to fever and in inflammations. The seeds are useful in giddiness, gonorrhea, thirst and inflammation. The syrup acts as an expectorant and diaphoretic and is used as a cooling drink in fevers.

EXPERIMENTAL METHODS:

The estimation of serum glutamate oxaloacetate transaminase (SGOT) is based on the reaction of L-asparate and α ketoglutarate the presence of GOT in the sample to yield oxaloacetate and L-glutamate. The oxaloacetate is reduced by malate dehydrogenous to yield L-malate with the oxidation of NADH to NAD. The reaction is monitored by measurement of the decrease in absorbance of NADH at 340nm. The rate of reduction in absorbance is proportional to GOT activity in sample. The working reagent is prepared by adding 1.1 ml of 2 SGOT and 1 SGOT and mixed well to dissolve and wait for 15 minutes prior to use and it should be used within 5 hours.

Fresh clear serum under fasting condition with no hemolysis is the specimen of choice. Similarly the estimation of serum glutamate pyruvate trabsminase (SGPT) is monitored by measurement of the decrease in absorbance of NADH at 340nm (6,7) and is based on the reaction L-alanine and α ketoglutarate in the presence of GPT in the sample to yield pyruvate and L-glutarate. The total acid phosphatase on hydrolysis in acied medium yields α naphthol in which it gives azo dye compound with diazo-2-chlor-5-toluene. The rate of formation of the azo compound at 405 nm is proportional to the total acid phosphatase activity and the kinetic determination of the alkaline phosphatase is based upon DGKC and SCE recommendations (8,9). To estimate the amount of cholesterol in serum, Boyle method is followed. The level of triglycerides was estimated by the procedure of Rice (10). The HDL cholesterol is estimated by the Heparin"s Manganese chloride precipitation method. LDL Cholesterol was calculated by using the formula given by fiedewald et al. [For histological examination, the rats were perfuse with 10% formalin and the tissues such as liver were removed and stored until use. They were later sectioned using a micro otome, dehydrated in graded alcohol embedded in paraffin section and stained by haematoxylin and eosin(11)].

RESULTS AND DISCUSSION:

Male wistar albino rats 4-6 weeks, 150gm were divided into 4 groups of 6 each. Group I served as a control group, receiving normal saline only 100ml/kg. alloxan was administered to animals of the other three groups by subcutaneous injection and diabetes was induced. The alcoholic extract of Solanum nigrumhas been used as a drug. The alloxan induced diabetic rats were administered to the drug after 7 days. Rats in group 3 were subjected to receive 100mg/kg per week. All the animals were killed after 7 dats, blood was collected & serum was separated for the different assays. The parameters sGOT, SGPT, Acid Phosphatase and Alkaline Phosphatase are shown in the following table.

Groups	Treatment	SGOT (IU/lit)	SGPT (IU/lit)	Acid Phosphatase	Alkaline Phosphatase
I	Normal 2ml/kg	37.7± 1.18	51.08± 0.24	10.5±0.06	2.35±0.06
II	Diabetic control 150gm	129.6±1.61	152.73±1.66	33±1.08	2.35±0.06
III	Solanum nigrum 100 mg/kg (oral)	61.8±1.42	89.8±1.45	16.5±0.64	1.5±0.15

IV	Solanum nigrum 200 mg/kg (oral)	59.2±1.20	83.1±1.55	16.0±0.12	2.0±0.95

To confirm the study of biopotency of solanum nigrum on diabetic induced rats, the following biochemical parameters were analysed. The results were compared with the normal rats.

Particulars	parameters	Total cholesterol (mg/dl)	Triglycerides (mg/dl)	HDL (mg/dl)	VLDL (mg/dl)	LDL (mg/dl)
Group I	Normal	86.95± 2.61	80.30± 2.41	52.17±1.56	16.06±0.48	18.72±0.56
Group II	Diabetic	123.04±3.69	112.54± 3.38	45.65±1.36	22.51±0.67	54.88±1.65
Group III	Diabetic + Solanum nigrum treated	78.26±2.35	73.07±2.19	50.00±1.5	14.62±0.44	13.64±0.41
Group IV	Positive drug control	86.95±2.78	65.38±1.96	51.09±1.53	13.08±0.39	17.00±0.68
Group V	Diabetic standard drug control	91.2±2.74	83.23±2.49	51.8±1.55	16.65±0.49	22.75±0.68

The levels were significantly increased in diabetic induced rats when compared to normal. The increased levels were diminished near to normal in solanum nigrum & silymarin treated rats, whereas the solanum nigrum treated rats, the levels were moderately increased when compared to diabetic induced rats.

CONCLUSION:

Male wister rats were divided into four groups each carries 6 animals. Group I animals were served as normal. Rest of all are treated with diabetic (5ml/day for 7 days). After 7 days, group III animals were treated with solanum nigrum leaf and group V animals were treated with standard drug sylimarin for 7 days. At end of experimental day the animals were sacrificed, the blood samples were collected for lipid profile estimation and liver was dissected for histopathological examination. In our study we found that increased levels of total cholesterol, triglyceride, VLDL and LDL while decreased level of HDL cholesterol in Diabetic induced rats. Solanum nigrum administration brought the above change near to normal. Morphology of liver cells was altered in Diabetic induced rats, when treated with solanum nigrum the liver morphological structure was maintained. In conclusion, the present investigation, show that solanum nigrum pososesses a hypolipidemic activity, which may be attributed to its protective action of hyperlipidemic and to the enhancing effect on HDL cholesterol level in Diabetic induced rats.

ACKNOWLEDGEMENT AND REFERENCES:

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