

Effect Of *Rosa Damascena* On Serum Marker Enzymes In Streptozotocin Induced Diabetic Rats

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1st	Nandhini. V	Associate Professor, Division of Biochemistry, School of Biological Sciences, CMS College of Science and Commerce, Coimbatore-Tamil Nadu
2nd	Dr. D. Victor Arokia Doss	Associate Professor, Department of Biochemistry, PSG College of Arts and Science, Coimbatore-Tamil Nadu

Abstract

Diabetes represents a spectrum of metabolic disorders, which has become a major health challenge worldwide (1). The unprecedented economic development and rapid urbanization in Asian countries, particularly in India had lead to a shift in the health problems from communicable to non – communicable diseases. Of all the non – communicable diseases, diabetes and cardiovascular diseases lead the list. Plants, as folk remedies, are widely used to treat diabetes mellitus. Antihyperglycemic effects of these plants are attributed to their ability to restore the function of pancreatic tissues by causing an increase in insulin output or inhibit the intestinal absorption of glucose or to the facilitation of metabolites in insulin dependent processes. Numerous chemical compounds such as phenformin and buformin are found to originate from the plant. Most of plants contain glycosides, alkaloids, terpenoids, flavonoids, cartenoids, etc., that are frequently implicated as having anti-diabetic effect (2). One such plant namely *Rosa damascena* are selected to evaluate the serum marker enzymes in streptozotocin induced diabetic rats. *Rosa damascena* mill L, is commonly known as Damask rose (3). It is one of the most important species of Rosaceae family. Rosaceae are well known ornamental plants and have been referred to as the king of flower (4). Rose oil heals depression, grief, nervous stress and tension. It helps in the reduction of thirst, healing cold cough, special complaints of women, wound healing, and skin health.

I. MATERIALS AND METHODS

1.1 Chemicals

All chemicals and solvents used in this study were of analytical grade.

1.2 Plant material and Preparation of 50% hydroethanolic plant extract

Rosa damascena flowers were collected from rose garden, Coimbatore, Tamilnadu, India and was identified by the Botanical Survey of India (BSI), Tamilnadu Agricultural University (TNAU) (Plant identification no: BSI/SRL/5/23/09-10/Tech). The coarse powder of fresh flowers of *Rosa damascena* were obtained by mechanical grinder and it was cold macerated with hydroethanol for 72 hours. A pinkish brown crystal thus obtained were suspended in distilled water and used for the study.

1.3 Procurement of animal

Male wistar rats weighing about 140 ± 20 grams were procured from PSG Institute of Medical Sciences and Research (CPCSEA No: 158/1999/CPCSEA) Coimbatore, Tamilnadu, India. All the procedures described were reviewed and approved by the Institutional Animal ethics committee (IAEC). The rats were grouped and housed in polyacrylic cages and were maintained under standard laboratory conditions. Rats were acclimatized to animal house conditions with controlled temperature and humidity and they are fed with standard rat feed supplied by Hindustan lever Ltd., Bangalore, Karnataka, India and filtered water *ad libitum*.

II. INDUCTION OF DIABETES

Streptozotocin was used to induce diabetes mellitus in normal rats through intraperitoneal injection. It was dissolved in ice cold 0.01M citrate buffer, pH 4.5 at a concentration of 50mg/kg and was injected to overnight fasting rats. Blood was collected through retro-orbital plexus after 72 hours of injection and the serum was separated by centrifugation at 2500rpm for 15 minutes. Blood glucose was then measured.

III. Experimental Groups

The animals were divided into five groups of six animals each after the acclimatization period.

Group I- (Normal control) Rats received standard pellet diet and distilled water.

Group II- (Diabetic control) The rats were made hyperglycemic by an intraperitoneal injection of Streptozotocin at a concentration of 50mg/kg body weight to overnight fasting rats.

Group III - Diabetic rats treated with oral administration of hydroethanolic flower extract of *Rosa damascena* at a concentration of 200 mg/kg body weight.

Group IV- Diabetic rats treated with oral administration of hydroethanolic flower extract of *Rosa damascena* at a concentration of 400 mg/kg body weight.

Group V- Diabetic rats treated with a standard drug Glibenclamide orally at a concentration 600µg/kg body weight.

The rats were fasted overnight and sacrificed by cervical decapitation at the end of experimental period (30 days). Serum was separated from the blood which was collected through cardiac puncture and was stored at 4°C for further biochemical analysis.

Biochemical estimations

Serum marker enzymes such as alanine transaminase, aspartate transaminase ⁽⁵⁾, alkaline phosphatase ⁽⁶⁾ and acid phosphatase ⁽⁷⁾ were assessed.

IV. STATISTICAL ANALYSIS & RESULTS

Data were reported as mean ± SD by using the Statistical Package of Social Sciences (SPSS, Version 10.0 for windows). The data for all the parameters was analysed by using Analysis Of Variance (ANOVA) and the group means were compared by Duncan’s Multiple Range Test (DMRT). Values were considered statistically significant when p < 0.05⁽⁸⁾.

Results: Effect of Hydroethanolic flower extract of *Rosa damascena* on serum marker enzymes in streptozotocin induced diabetic rats

The results showed that (Table 1 and 2) the levels of alanine transaminase, aspartate transaminase, alkaline phosphatase and acid phosphatase were found to be significantly increased in diabetic control rats (group II) when compared to normal control rats (group I). Treatment with hydroethanolic flower extract of *Rosa damascena* at a concentration of 200mg/kg and 400mg/kg (Group III and IV respectively) showed a significant decrease in the above serum marker enzymes when compared to diabetic control rat (group II). Diabetic rats treated with a standard drug Glibenclamide at a dosage of 600 µg/kg recouped the levels of serum marker enzymes.

Table 1 : Effect of *Rosa damascena* flower extracts on serum alanine and aspartate transaminases of control and experimental rats

Groups	ALT (IU/L)	AST (IU/L)
Group – I	43.17 ± 2.76*	52.21 ± 3.25*
Group – II	81.32 ± 3.53	108.73 ± 5.83
Group – III	41.97 ± 2.31*	50.82 ± 5.32*
Group – IV	42.59 ± 3.29*	51.07 ± 3.60*
Group – V	43.73 ± 3.56*	52.36 ± 3.11*

Values are expressed as mean ± SD (n=6) (p<0.05)

Group Comparison: G2 vs G1, G3,G4 and G5

Statistical Significance: * - P< 0.05, ns = not significant

Table 2 : Effect of *Rosa damascena* flower extracts on serum Acid and Alkaline Phosphatases of control and experimental rats

Groups	ACP (IU/L)	ALP (IU/L)
Group – I	45.03 ± 2.88*	37.56 ± 1.75*
Group – II	88.17 ± 5.03	64.53 ± 3.71
Group – III	43.64 ± 1.98*	35.11 ± 1.91*
Group – IV	44.01 ± 2.41*	36.24 ± 2.10*
Group – V	46.18 ± 2.56*	38.15 ± 1.89*

Values are expressed as mean \pm SD (n=6) (p<0.05)

Group Comparison : G2 vs G1, G3,G4 and G5

Statistical Significance : * - P< 0.05, ns = not significant

V. DISCUSSION

The increase in the activities of serum AST, ALT indicated that Diabetes mellitus may induce hepatic dysfunction. The enzymes directly associated with the conversion of amino acids to keto acids are AST and ALT, and are increased in the diabetic condition. Serum ALT, AST levels were determined to evaluate the hepatic functions⁽⁹⁾. The increase in aminotransferase levels may be due to the cellular damage in the liver caused by STZ-induced diabetes. Although ALT is also present in mitochondria and cytosol, the mitochondrial form is low in activity and is very unstable. Experimental studies have shown that subtle membrane changes are sufficient to allow passage of intracellular enzymes to the extracellular space⁽¹⁰⁾. Studies reported that AST activity in treated group was lower than the amount of enzyme present in diabetic rat tissues⁽¹¹⁾. It is suggested that this may be due to the inactivation of cytosolic AST in the diabetic rat tissues by a glycation reaction, accompanied by impairment in glucose utilization in STZ induced diabetes.

Alkaline phosphatase is a membrane bound glycoprotein enzyme. It is present in highest concentrations in the sinusoids and in the endothelium of the central and periportal veins; smaller concentrations occur in the biliary canaliculi. Various reports showed an increased ALP activity in experimentally induced diabetic rats⁽¹²⁾. Increased activities of phosphatases in diabetes may affect the transport of metabolites across the membrane due to alteration in dephosphorylation reactions.

Acid phosphatases are found in different organs, and their serum levels are used to evaluate the diseased state of liver and kidney. Acid phosphatases were found to be significantly increased in diseased state⁽¹³⁾ which may be due to increased dephosphorylation of enzymes in the liver.

Hence from the present study it was found that Hydroethanolic extract of *Rosa damascena* plays a crucial role in recouping the serum marker enzymes under the stress in diabetes mellitus.

VI. SUMMARY AND CONCLUSION:

The present investigation suggested that the phytochemicals present in the hydroethanolic extract of *Rosa damascena* might have decreased the serum marker enzymes in treated groups rather than in untreated groups. An effective treatment was also found with a standard drug Glibenclamide at a concentration of 600 μ g/kg body weight. Further prospects include the pharmacological investigations and mechanism of action of the active components present in the plant.

VII. REFERENCES

- [1] King H., Aubert R.E. and Herman W.H. (1998). Global burden of Diabetes, 1995- 2025- Prevalence, numerical estimates and projections. *Diabetes Care*, 21: pp 1414 – 31.
- [2] Neelesh M., Sanjay J. and Sapna M. (2010). Antidiabetic potential of Medicinal plants. *Acta poloniac Pharmaceutica. Drug Research*, 67 (2): pp 113-118.
- [3] Kaul V.K., Singh V. and Singh B. (2000). *Damask rose* and marigold: Prospective industrial crops. *J. Med. Aromat. Plant Sci.*, 22: pp 313-318.
- [4] Cai Y.Z., Xing J., Sun M., Zhan Z.Q. and Corke H. (2005). Phenolic Antioxidants (hydrolyzable Tannins, Flavonols, and Anthocyanins) identified by LC-ESI-MS and MALDI-QIT-TOF MS from *Rosa chinensis* flowers. *J Agric FoodChem.*, 53: pp 9940-9948.
- [5] Reitman S. and Frankel S.A. (1957). Colorimetric method for the determination of Serum Glutamic Oxaloacetic, Glutamic Pyruvic Transaminases. *A. J. Clinical Pathol.*, 28: pp 56 – 63.
- [6] King E.J. and Armstrong A.R. (1934). Determination of serum and bile phosphatase activity. *Can. Med. Assoc. J.*, 31: pp 56 – 63.
- [7] King J. (1965a). The hydrolase Acid and Alkaline phosphatases. In: Practical Clinical enzymology. Van. D. Eds. *Norstand Company Ltd.*, pp 83 – 93.
- [8] Duncan B. D. (1957). Multiple range test for correlated and heteroscedastic means: *Biometrics*, 13: pp 359-364.
- [9] Degirmenchi I., Kalender S., Ustuner M.C., Kalender Y., Gunes H.V., Unal N. and Basaran A. (2002). The effects of Acarbose and *Rumex patientia* on liver ultrastructure in Streptozotocin-induced diabetic (type-II) rats. *Drugs Exp.Clin. Res.*, 28: pp 229-34.
- [10] Garella S. (1997). The cost of dialysis in the USA. *Nephrol. Dial.Transplant.*, 12: pp 10-2.
- [11] Okada M., Murakami Y. and Miyomoto E. (1997). Glycation and inactivation of Aspartate Aminotransferase in Diabetic rat tissues. *J. Nutr. Sci. Vitaminol.*, 43(4): pp 463-9.
- [12] Prince P.S.M., Menon V.P. and Pari L. (1997). Effect of *Syzygium cumini* extracts on hepatic hexokinase and glucose 6-phosphatase in experimental diabetes. *Phytother Res.*, 11: pp 529-31.
- [13] Bull Murray P.G., Thomas D., Fraser A.M and Nelson P.N. (2000). Acid Phosphatases. *Mol Pathol.*, 55 : pp 65-72.

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